

1988

PERFORMANCE REPORT

WATER QUALITY SECTION



Environment
Ontario

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1988
PERFORMANCE REPORT
WATER QUALITY SECTION

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Water Quality Section
Laboratory Services Branch
Ministry of the Environment

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ACGT

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ACKNOWLEDGEMENT

This report is dedicated to the technicians of the Water Quality Section who, in the pursuit of quality data for their clients, performed the numerous analysis summarized in this report. The magnitude of this task becomes apparent when one realized that each datum required analysis, graphical representation, evaluation and, in some cases, transfer to a microcomputer.

and

We gratefully acknowledge the contribution of Lisa Gilhooley, who provided the printout for the performance summaries, graphs, and appendices.

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Quality Control Program

The Water Quality Section of the Ministry of the Environment, Laboratory Services Branch is responsible for analysis of water quality parameters on a large number of samples. By using suitably sensitive instrumentation and methodologies in conjunction with carefully planned and monitored quality assurance programs, the Water Quality Section is able to maintain a high standard of analytical performance. This performance is certified through regular participation in interlaboratory round-robins. While results on these round-robins are not included in this report, they are available on request. This report does provide an outline of the Quality Control program, and a summary of performance data for 1988 for all the chemistry units. A description of the Microbiological Quality Control program is included in the second section.

The major objective of the Quality Control program is to ensure immediate detection and correction of unacceptable analytical performance. In practice, the activities are divided into continual checks of basic analytical tools such as chemicals, water purity, containers, instrumentation, calibration and recovery.

The quality control program for chemicals involves the purchase of high purity materials and regular analysis of these chemicals for contamination. An understanding of their shelf life and health effects is a vital part of this program. Distilled and deionized, distilled water sources are monitored daily for conductivity.

Sample containers, filters, glassware and all other equipment used in the collection and analysis of samples are checked for leaching, adsorption and contamination. The publication *"A Guide to the Collection and Submission of Samples for Laboratory Analysis"* (1985) contains recommendations for sample containers, preservatives and sampling techniques.

Calibration is achieved by using standards covering the analytical range, and is performed before the analysis commences. Since a high degree of both precision and accuracy is required to detect and minimize any between-run changes, the standards are analyzed with as little handling and preparation as possible.

Once a system has been calibrated, quality control begins. Depending on the analytical procedure, one or more of the following checks is performed: calibration, blank, recovery or potential interferences. To obtain duplicate data, the first aliquots of samples are analyzed early in the run. The second aliquots are analyzed later in the same run. In addition, calibration standards and blanks are analyzed periodically throughout the day to control sensitivity and baseline drift respectively.

Calibration Control

The calibration is controlled by a minimum of two quality control standards and a long term blank which are made up and maintained independently of the calibration standards. The system is not calibrated with these solutions. The long term blank is deionized, distilled water and any reagent chemicals used in the pretreatment of samples. Control standards are prepared less frequently than calibration standards and errors in calibration standards can be detected. Overlapping analysis on new solutions of control standards assure that errors in their preparation are detected.

When the control standards are analyzed, their sum and difference are plotted versus time, on a chart and used immediately to determine whether the calibration process is in control. The control limits, against which the daily values are compared, are determined from previous data. In general, the daily values are allowed to vary by $\pm 4.5 S_{A-B}$ and $\pm 3 S_{A-B}$ for the sum and difference respectively. If either the sum or the difference is out of control, the system is stopped, corrective action taken and the control samples are re-analyzed. This cycle is repeated until the system is brought within control limits.

The actual values of the control standards are examined whenever their sums or differences are out of control. The standard deviations of the control standards are used to estimate the between run standard deviation (S) and the within run standard deviation (S_w). Values for S and S_w are calculated as follows:

$$2S_w^2 = (S_{A-B})^2$$

$$2S^2 = (S_A)^2 + (S_B)^2$$

Where

S_A = standard deviation of control sample A

S_B = standard deviation of control sample B

S_{A-B} = standard deviation of difference for
control samples A and B

N.B. If a second range is employed for one test, more quality control standards are used because, in many systems, the between run standard deviation may be concentration dependent.

For a detailed description of the quality control standard process, refer to references 1, 2, 3 and 4 in the bibliography.

Recovery Checks

In methods where sample preparation, such as digestion or extraction, is required, a recovery check, suitable to that system, is required to estimate the efficiency of the pretreatment. Recovery standards are usually prepared at 0, 20 and 80% of full scale. The solutions are analyzed daily in the same manner as routine samples. Although these solutions are not used to calibrate the instrument, corrections for the blank and matrix effects are estimated and applied if necessary. For an analytical run to be accepted, the recoveries should be within $\pm 5\% + T/2$ of their expected values. (T is set as a multiple of the minimum measurable response level W) The average blank should be within three standard deviations of its historical mean. If a second range is employed for a test, at least one additional recovery standard is used.

Sensitivity Checks

Any change in the sensitivity of the instrumentation, over the period of analysis, is monitored by analyzing samples of a high standard periodically and comparing the peak height to the original calibration standards. Baseline drift is also recorded by periodic analysis of samples which do not contain any of the analyte. In most cases, this is deionized, distilled water but the matrix may be adjusted to correspond to sample pretreatment. The baseline should not drift more than 5% of full scale over the course of the entire run. Sensitivity changes within the 5% limits can be corrected mathematically. The frequency of these check samples is determined from historical data for each analytical system.

Interference Checks

Interference checks are run on any test where a material may be present in large enough concentration to affect the results. The checks are near the threshold concentration, beyond which the methodological safeguards, to minimize the interferences, are no longer effective. These checks indicate that the interferences have no effect up to the specified concentrations. Spiked checks are not performed on a routine basis.

Duplicate Data

Natural samples are selected for non-adjacent, within-run duplicate analysis. By analyzing samples in duplicate, the ability of the analyst to obtain repeatable analytical results, within a short period of time, can be determined. For results to be acceptable, at least two-thirds of the duplicate data must conform to limits which are based on historical performance.

For this performance report, the observed differences in duplicate results are accumulated and sorted according to sample concentration span. A standard deviation is then calculated for each of these spans. The algorithm differs from the conventional standard deviation as follows:

Conventional Std. Dev.

$$S_1 = \sqrt{\frac{\sum_{i=1}^n (\bar{x} - x_i)^2}{n-1}}$$

Std. Dev. of Duplicates

$$S_2 = \sqrt{\frac{\sum_{i=1}^n (x_1 - x_2)_i^2}{2n'}}$$

Where

S_1 = sample standard deviation
 S_2 = duplicate difference standard deviation
 n = number of data
 \bar{x} = mean of data
 x_i = i^{th} result
 $(x_1 - x_2)_i$ = difference of the i^{th} duplicate
 n' = number of duplicate pairs

FORMAT FOR PERFORMANCE REPORT

The types of samples analyzed in the Water Quality Section include ground water, surface water, sewage, industrial waste, leachates, soils, soil extract, drinking water and precipitation. The Laboratory Information System (LIS) is a centralized computer system which routes samples to a specific workstation and receives results to format into reports.

There is a performance report for each test. Information is provided to assist the reader in identifying the data which is appropriate to the various sample types and classes. The performance reports consist of a general summary sheet for each parameter, followed by one or more sheets of tabulated data and a plot of control standards, recovery checks and duplicate results, where applicable. The remainder of this section outlines the type of information which is included in the individual performance reports.

SUMMARY SHEET

TITLE:

The name of the parameter in the summary.

IDENTIFICATION:

Laboratory:	Where the test is performed on the sample types listed.
LIS Test Name Code:	LIS code used to request analysis.
Workstation Code:	LIS code for workstation where sample is routed.
Method Code:	LIS code for the analytical procedure.
Method Introduced:	Date that the method was implemented at the laboratory.
Units:	Units in which the results are reported.
Unit Code:	LIS code for the units.
Supervisor:	Supervisor responsible for the laboratory.
Sample Type/Matrix:	The various sample types that can be routed to the workstation.

SAMPLING:

A brief description of the type of bottle to use, preservatives (if applicable) and minimum volume of sample required. Any sample preparation, which must be performed in the field, is also given.

SAMPLE PREPARATION:

Sample preparation techniques which must be performed at the laboratory before analysis.

ANALYTICAL PROCEDURE:

A brief description of the analytical method used to test for the parameter. For detailed method descriptions, refer to reference 4 in the bibliography.

INSTRUMENTATION:

Instrumentation, used to perform the test, is given. A detailed description can be found in reference 5. Reference to automated continuous flow systems consist of a sampler, peristaltic pump, manifold for reagent addition, detection system and a readout system. Use of microcomputers, to control operation of analytical equipment and/or data acquisition, is identified.

REPORTING:

The maximum number of significant figures used to report the result. The calculated W value is reported when no detectable response of the instrumentation is observed. Results, which are less than the T value, are indicated by the <T remark. For a further explanation of the W and T significance, refer to appendix A.

CALIBRATION:

The number of different standards used to calibrate the analytical system daily.

CONTROLS:

The calibration control, recovery control and drift control standards, that are used, to ensure the proper operation of the system and may include the frequency of analysis.

MODIFICATIONS:

Modifications to the test since the publication of "*Handbook of Analytical Methods for Environmental Samples*" (HAMES) (reference 5).

NOTES:

Explanatory notes which may aid the data user in interpreting results and information.

PERFORMANCE DATA

For each performance report, there will be at least one tabulated data page.

TITLE:

The name of the parameter.

QUALITY CONTROL DATA FROM/TO:

The dates of the collection period for the data.

LAB:

The laboratory in which the data were collected.

ANALYTICAL RANGE:

The full scale value for the analytical range is given in concentration units. However, the lower limit of the range is specified by the T value found on each method summary sheet.

CALIBRATION CONTROL:

A table for the calibration control standards. The within run standard deviation (S_w), the between run standard deviation (S), the ratio S/S_w and the ranges for acceptance of the A+B and A-B values are shown.

RECOVERIES:

A table for the recovery control standards.

DUPLICATES:

A table for the within run data of the duplicate aliquots. The data are sorted into a number of concentration spans. The coefficient of variation (%) is obtained by dividing the mean standard deviation (S_2) for a particular concentration span by the mean concentration of duplicate results in that span and multiplying by 100.

OTHER CHECKS:

Data for any other checks which may be used.

QUALITY CONTROL GRAPHS

For each data page there is one quality control graph page.

TITLE:

The name of the parameter and appropriate units.

DATE FROM/TO:

Dates on plot correspond to dates on performance data page.

CALIBRATION CONTROL:

Calibration control standard sums and differences are plotted on a horizontal scale for the period of data collection. the vertical scale is centred on the expected value. Control limits ($\pm CL$) were chosen from previous analytical performance when available. Frequent data outside the limits, indicate a system out of control or excessively close limits. The concentration for the two control samples A and B are chosen to cover both the high and low ends of the operation scale. On many systems, one or two additional samples are run at the low end of the range (C and D) to facilitate the detection of blank problems.

RECOVERY PLOTS:

Where recovery checks are performed, the highest and lowest concentrations are plotted. The horizontal scale is identical to the calibration control plots. The vertical scale is centred on the expected value.

DUPLICATE PLOTS:

All duplicate results, for the period, are summarized in a three segment plot. Each segment is a portion of the full scale calibration. These segments may not correspond to the spans listed in the PERFORMANCE DATA page. In each concentration category, the absolute differences between duplicate samples are grouped to determine their frequency. The relative number of occurrences, in each range, are plotted as a percentage of the total in three frequency histograms. As the histogram ranges are calculated with respect to full scale, they cover the same span of absolute differences in concentration for each of the graphs, and the distribution can, therefore, be compared directly.

MICROBIOLOGICAL
QUALITY CONTROL

MICROBIOLOGICAL QUALITY CONTROL

Analysis of microbiological samples for bacteria indicative of pollution requires the careful use of methods and techniques by technicians to ensure that no extraneous contamination is accidentally introduced into the analytical procedure to produce either false positive or false negative results. Checks are made to determine that the analytical procedures are functioning properly and providing the client with results that are both accurate and reproducible within the limits of normal statistical variation. To this end, a series of quality control tests are conducted on a regular basis and their results are monitored so that any irregularities in the test procedures are corrected and false results are not reported.

Membrane Filter Tests (MF)

Blank Control Filters

Each sample analyzed by the membrane filter test is separated from the previous sample by introducing a control filter at the beginning of each analysis. The control filter is placed on the bacterial medium used for incubation of filters from the sample, so that all filters are incubated under the same conditions. If any bacteria appear on the control filter, they were likely carried over from the previous sample. No target or indicator organisms and <10 non-target or background organisms should appear on the control filter. If these limits are exceeded, the senior technician or scientist should be consulted to decide whether the extent of carry-over of bacteria would materially bias the results of the next sample. If excessive bias is suspected the result will not be reported.

Duplicate Analyses

Duplicate analyses are done at a frequency of one in twenty samples. For the Drinking Water Unit both raw and treated water samples will be chosen to provide valid duplicate count results. The results for the duplicate analyses will be accumulated over time for each parameter and a within-run or between-run standard deviation will be calculated to give a measure of the reproducibility of results. On a day to day basis, duplicate counts should not vary from each other by more than a factor of three.

Media Quality Control

A number of checks are made during and after the preparation of a batch of medium. The pH of a medium is monitored after all the ingredients have been added and again after sterilization has taken place. The final pH should not vary by more than 0.2 units from the recommended value. The medium is checked for sterility at both 20 C and 35 C by incubating random samples of either tubes or plates depending on how the medium is dispensed. Any bacterial growth will require retesting of the medium for sterility. Confirmation of contamination will result in the rejection of the medium for any further use. The batch or lot number of a medium is recorded to determine if any changes in quality occur when batch or lot numbers change.

Differential agar media used in the detection and enumeration of indicator bacteria are tested to ensure their proper functioning. The medium is streaked with both a known target organism or positive culture and a known non-target organism or negative culture. If the medium is functioning properly, growth of the target organism will be abundant after 24 to 48 hours and growth of the non-target organism will not occur or will be minimal even after 72 hours of incubation. The results of all such tests are recorded and any deviations from the expected results will require retesting or rejection of the medium.

A quantitative QC test of agar media for membrane filter tests involves making up dilute suspensions of the positive and negative cultures. Selected dilutions of these suspensions are passed through membrane filters, which are then placed on plates of both the inhibitory or selective medium and plates of a non-inhibitory or non-selective medium, such as Brain Heart Infusion agar. The positive culture should form approximately the same number of colonies on the selective and non-selective media plates, whereas the negative culture should only form colonies on the non-selective medium. Results are recorded and statistically analyzed in a manner similar to that for duplicate analyses.

Presence-Absence (P-A) Tests

Blank Control P-A Bottles

For each group of 21 samples, a blank control is prepared by pouring a 99 mL dilution blank into a P-A bottle and incubating it along with the regular P-A bottles. The P-A blank bottle is incubated for four to five days and should remain free of any bacterial growth or colour change. Usually several blank control bottles are prepared each day. Growth in more than one P-A blank control test will require rechecking of the sterility of the dilution blanks and P-A medium.

Media Quality Control

A number of checks are performed on the P-A broth including pH (6.8), sterility at 20 C and 35 C and growth reaction of Escherichia coli. If the medium is functioning properly, E. coli will produce a strong acid reaction (yellow colour in the medium) and agitation of the bottle will cause release of the dissolved gas in the medium producing a layer of foam at its surface.

In addition, a quantitative test of the P-A broth is done by pipetting 2 mL of broth onto a filter pad and filtering a suspension of E. coli through a membrane filter, which is then placed on the filter pad saturated with the P-A broth. A second MF is prepared with a similar volume of an E. coli suspension and placed on Brain Heart Infusion agar in a petri dish. Previous testing has shown that E. coli colony counts on both filters should be approximately the same. Quality Control checks on EC broth, Lactose Purple broth, MacConkey agar, Nutrient Gelatin Yeast Extract agar and Mannitol Salt agar include pH readings, sterility and bacterial growth reactions of positive and negative cultures inoculated onto or into each medium. If any Quality Control tests fail, the medium is either retested or rejected.

Age of Samples

The accurate determination of bacterial numbers for indicator or heterotrophic bacteria in a sample depends on how quickly the sample can be transported to the laboratory for analysis. Water samples should be kept as closely as possible to the original water temperature by using a foam-packed container, which includes a central plastic bottle containing water that has been frozen, or by cooling to refrigeration temperatures before shipment to the laboratory.

Samples should arrive at the laboratory on the same day as sampled or, if refrigerated, within 24 hours. For sewage effluent and surface water samples, no analysis will be done if the samples are older than 48 hours; for drinking water samples, the time limit is 72 hours, and for legal samples, it is 24 hours. Limits on the age of samples for analysis must be in place as bacterial numbers in samples may increase or decrease depending on nutrients, toxic elements and the influence of temperature on the metabolic activities of the organisms. The longer the time period between sampling and analysis, the greater the chance for producing either inflated or deflated numbers of organisms per 100 mL of sample.

PERFORMANCE SUMMARIES

*****ACID AMMONIUM OXALATE EXTRACTABLE(Al,Fe,Mn,Si)*****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 1986
LIS Test Name Code	: Al/,Fe/,MN/,SI/(EOX)	Units	: %as Al,Fe,Mn,Si
Work Station Code	: DOMETOX	Unit Code	: 070813, 070826, 070825, 070814
Method Code	: 302AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 gm air dried, sieved to <2mm, then ground to <500 um
(ground to <150 um for baseline samples).
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are weighed into disposable tubes. 10 mL of acid ammonium oxalate extractant is added and the tubes are capped and shaken for 4 hours in the dark. Samples are then centrifuged and the analysis is performed on the supernatant.

INSTRUMENTATION:

Varian AA 1275

REPORTING:

Maximum Significant Figures: 2,2,3,2 Current W value:0.01,0.01,0.001,0.01
T value: 0.05,0.05,0.005,0.05

CONTROLS:

Calibration : 6 Standards covering the following ranges; 0-2.00 Fe, 0-2.00 Al, 0-0.25 Si, and 0-0.10 Mn.
Other Controls: Three long term soil samples and 2 method blanks are run with each set.

MODIFICATIONS:

1986 - disposable tubes are used and the tubes are wrapped in foil.

Acid Ammonium Oxalate ext. Aluminum
QUALITY CONTROL DATA FROM 23/03/88 TO 24/11/88

Lab: Dorset Soils

Analytical Range: - to 2.00 % as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn. Measured	Av. Bias	Standard(1) Deviation
a :	3	1.50	1.53	0.03	0.042
b :	3	0.50	0.52	0.02	0.015
a+b :	3	2.00	2.05	0.05	0.044
a-b :	3	1.00	1.00	0.00	0.045

s.d.(AB): Sw(within run): 0.032 S(between runs): 0.032 S/Sw: 0.99

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.70 to 2.30 for A+B
0.80 to 1.20 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	4	1.32	1.31	0.127
r2 :	4	0.23	0.23	0.017
r3 :	4	0.16	0.16	0.018

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.00 - 0.40	N/A	N/A
6	0.40 - 1.00	0.032	5.3
2	1.00 - 2.00	0.086	7.3
9	Overall	0.049	N/A

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	4	0.00	0.000

* NOTE: Due to insufficient data, graphs have been excluded.

Acid Ammonium Oxalate ext. Iron
QUALITY CONTROL DATA FROM 23/03/88 TO 24/11/88

Lab: Dorset Soils

Analytical Range: - to 2.00 % as Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	3	1.50	1.53	0.03	0.080
b :	3	0.50	0.51	0.01	0.015
a+b :	3	2.00	2.04	0.04	0.085
a-b :	3	1.00	1.01	0.01	0.078

s.d.(AB): SW(within run): 0.055 S(between runs): 0.058 S/SW: 1.04

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.70 to 2.30 for A+B
0.80 to 1.20 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	4	0.90	0.91	0.092
r2 :	4	0.50	0.49	0.084
r3 :	4	0.75	0.73	0.071

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
4	0.00 - 0.40	0.015	8.4
2	0.40 - 1.00	0.061	8.8
3	1.00 - 2.00	0.058	4.4
9	Overall	0.045	N/A

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	4	0.00	0.000

* NOTE: Due to insufficient data, graphs have been excluded.

Acid Ammonium Oxalate ext. Manganese
QUALITY CONTROL DATA FROM 22/11/88 TO 24/11/88

Lab: Dorset Soils

Analytical Range: - to 0.100 % as Mn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	3	0.075	0.076	0.001	0.0035
b :	3	0.025	0.026	0.001	0.0015
a+b :	3	0.100	0.102	0.002	0.0050
a-b :	3	0.050	0.049	-0.001	0.0021

s.d.(AB): Sw(within run): 0.0015 S(between runs): 0.0027 S/Sw: 1.81

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.085 to 0.115 for A+B
0.040 to 0.060 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	3	0.007	0.006	0.0006
r2 :	3	0.084	0.085	0.0042
r3 :	3	0.001	0.000	0.0006

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
5	0.000 - 0.020	0.0007	30.7
1	0.020 - 0.050	N/A	N/A
0	0.050 - 0.100	N/A	N/A
6	Overall	0.0027	N/A

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	3	0.000	0.0000

* NOTE: Due to insufficient data, graphs have been excluded.

Acid Ammonium Oxalate ext. Silicon
QUALITY CONTROL DATA FROM 11/02/88 TO 24/11/88

Lab: Dorset Soils

Analytical Range: - to 0.25 % as Si

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	3	0.19	0.19	0.00	0.000
b :	3	0.06	0.06	0.00	0.006
a+b :	3	0.25	0.25	0.00	0.006
a-b :	3	0.13	0.13	0.00	0.006

s.d.(AB): Sw(within run): 0.004 S(between runs): 0.004 S/Sw: 1.00

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.21 to 0.29 for A+B
0.10 to 0.15 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	6	0.16	0.16	0.024
r2 :	6	0.02	0.02	0.005
r3 :	6	0.01	0.01	0.005

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.00 - 0.05	N/A	N/A
2	0.05 - 0.10	N/A	N/A
3	0.10 - 0.25	0.014	8.1
6	Overall	0.013	N/A

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	3	0.00	0.000

* NOTE: Due to insufficient data, graphs have been excluded.

***** ACIDITY - GRAN *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/08/82
LIS Test Name Code	: ACDG	Units	: ug/L as H
Work Station Code	: PHACD	Unit Code	: 064801
Method Code	: 001BT5	Supervisor	: F. Lo
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 15 mL
Container : Polystyrene or equivalent

ANALYTICAL PROCEDURE:

Sample aliquots (10.0 mL) are titrated with 0.01 N sodium hydroxide to a pH >8.3. The titrant is standardized against 0.0005 N potassium hydrogen phthalate. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH readings following each aliquot of titrant. Data are subjected to Gran analysis.
N.B. pH and total fixed endpoint acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : LTBL (expected result is 16.6 ueq/H) plus 2 standards, e.g. QCA

MODIFICATIONS:

01/08/82 -QC program was expanded to include Gran acidity for which the reporting units are ug/L as H.
01/05/83 -System was fully automated by introduction of a sampler, and an automated device for washing the electrode between analyses.
01/06/84 -Normality of KHP used to standardize the base was reduced from 0.005N to 0.0005N.
30/05/86 -Direct Computer Input (DCI) to the Laboratory Information System (LIS) was introduced.

ACIDITY - GRAN
QUALITY CONTROL DATA FROM 11/01/88 TO 28/12/88

Lab: Titration

Analytical Range: - to 1000 ueq/L as H

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	96	500	504	4	7.7
b :	96	200	208	8	7.2
a+b :	96	700	712	12	11.6
a-b :	96	300	296	-4	9.4

s.d.(AB): Sw(within run): 6.6 S(between runs): 7.5 S/Sw: 1.12

On any given day the calibration is accepted if the values obtained lie within the ranges:

670 to 730 for A+B
 280 to 320 for A-B

DUPLICATES:

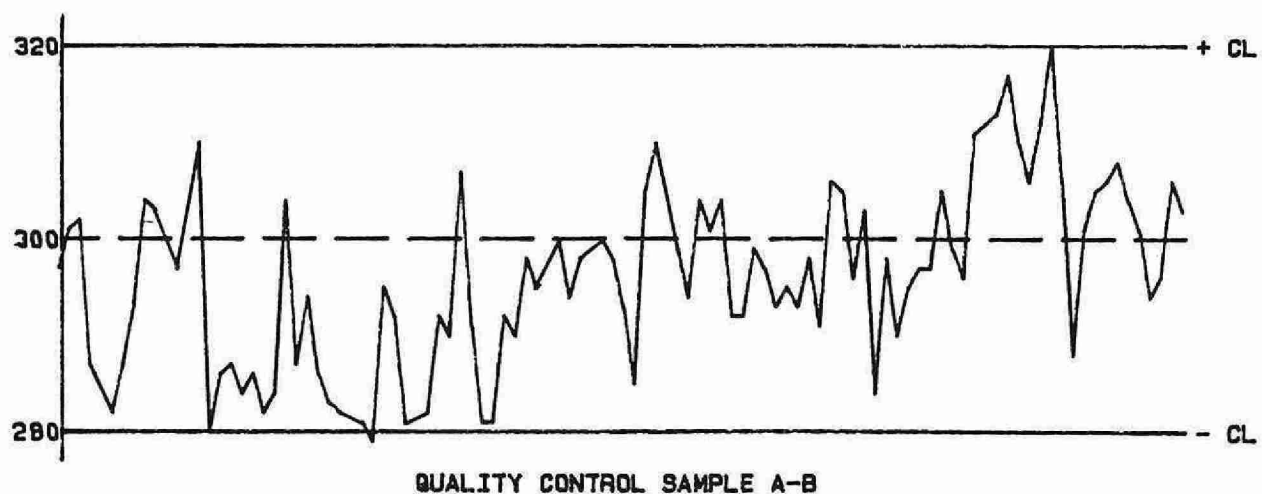
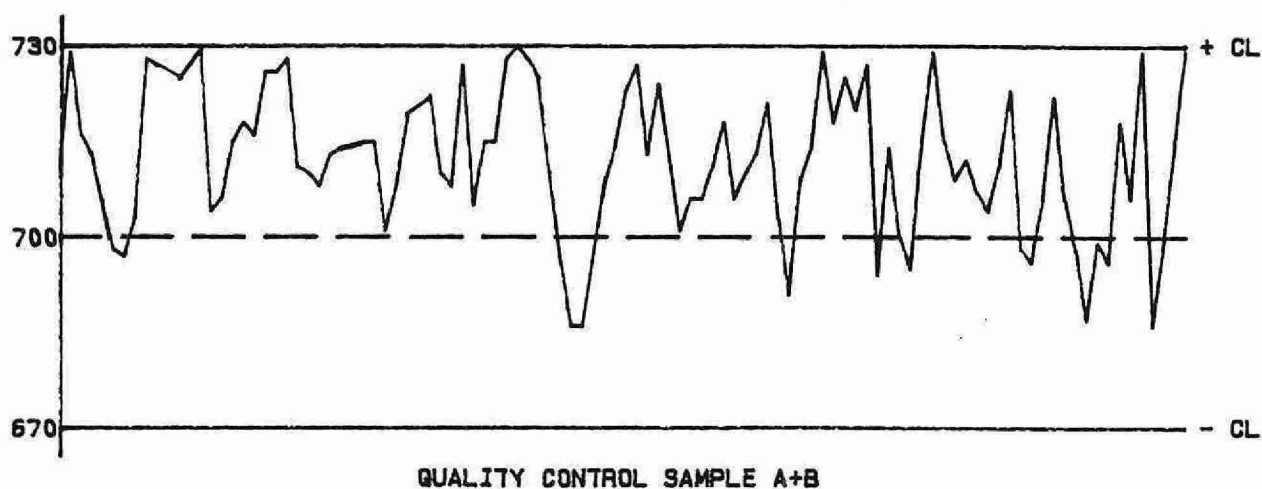
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
57	0.0 - 40.0	2.80	10.2
121	40 - 100	3.3	4.8
35	100 - 250	4.6	3.3
1	250 - 500	N/A	N/A
2	500 - 1000	4.0	0.6
216	Overall	3.5	N/A

OTHER CHECKS:

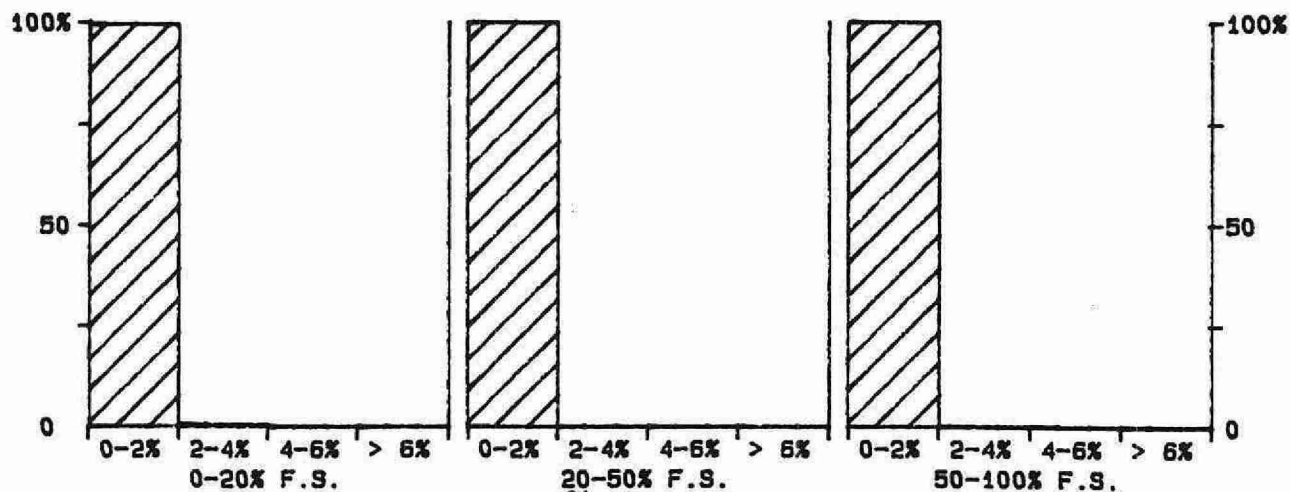
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	82	19.10	8.221

QUALITY CONTROL GRAPHS ACIDITY - GRAN (UEQ/L AS H)

FROM: 11/01/88
TO: 28/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1000 Ueq/L AS H

***** ACIDITY - TOTAL FIXED ENDPOINT (TFE) *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/05/79
LIS Test Name Code	: ACDT	Units	: mg/L as CaCO ₃
Work Station Code	: PHACD	Unit Code	: 064915
Method Code	: 001BT2	Supervisor	: F. Lo
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow, Domestic Waters, Rivers, Lakes (by special request: Industrial Waste, Sewage)		

SAMPLING:

Quantity Required	: 15 mL
Container	: Polystyrene or equivalent

ANALYTICAL PROCEDURE:

Sample aliquots (10.0 mL) are titrated in an automated system with 0.01 N sodium hydroxide to a pH >8.3. The titrant is standardized against 0.005 N potassium hydrogen phthalate. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH readings following each aliquot of titrant.
N.B. pH and Gran acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration: LTBL plus 2 standards, e.g. QCA

MODIFICATIONS:

01/04/82 -Sample volume was decreased from 100.0 to 10.0 mL.
01/05/83 -System was fully automated by introduction of a sampler, and an automated device for washing the electrode between analyses.
01/06/84 -Normality of KHP used to standardize the base was reduced from 0.005N to 0.0005N.
30/05/86 -Direct Computer Input (DCI) to the Laboratory Information System (LIS) was introduced.

ACIDITY - TOTAL FIXED ENDPOINT (TFE)
QUALITY CONTROL DATA FROM 11/01/88 TO 28/12/88

Lab: Titration

Analytical Range: - to 100.0 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	100	25.0	25.2	0.2	0.43
b :	100	10.0	10.5	0.5	0.39
a+b :	100	35.0	35.7	0.7	0.62
a-b :	100	15.0	14.8	-0.2	0.54

s.d.(AB): Sw(within run): 0.38 S(between runs): 0.41 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

32.9 to 37.1 for A+B
13.6 to 16.4 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	54	0.00 - 2.00	0.136	9.0
	127	2.00 - 5.00	0.142	4.1
	30	5.00 - 10.00	0.252	4.0
	6	10.0 - 25.0	0.36	3.1
	0	25.0 - 100.0	N/A	N/A
	217	Overall	0.17	N/A

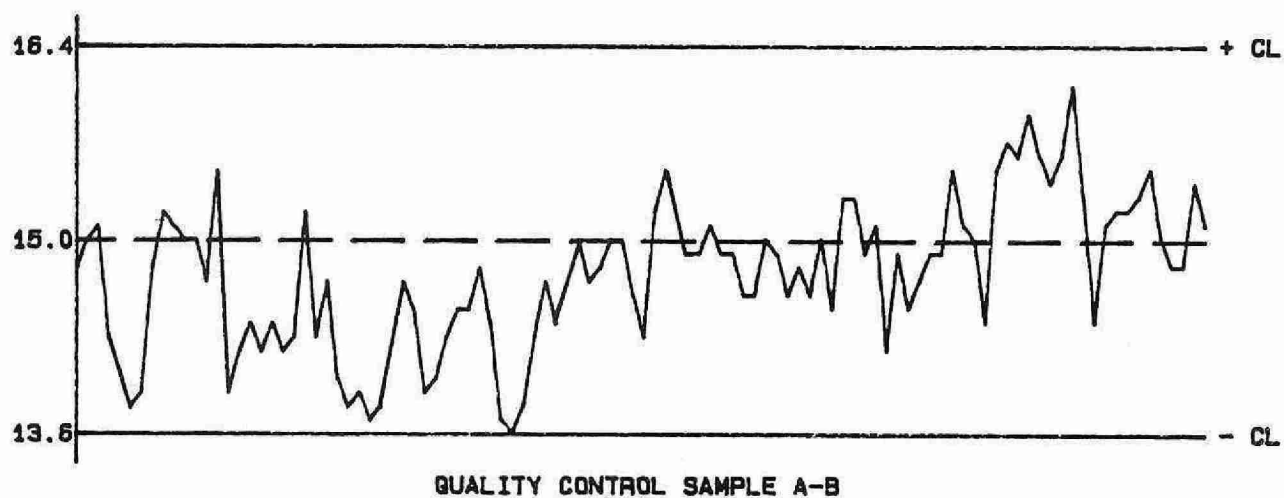
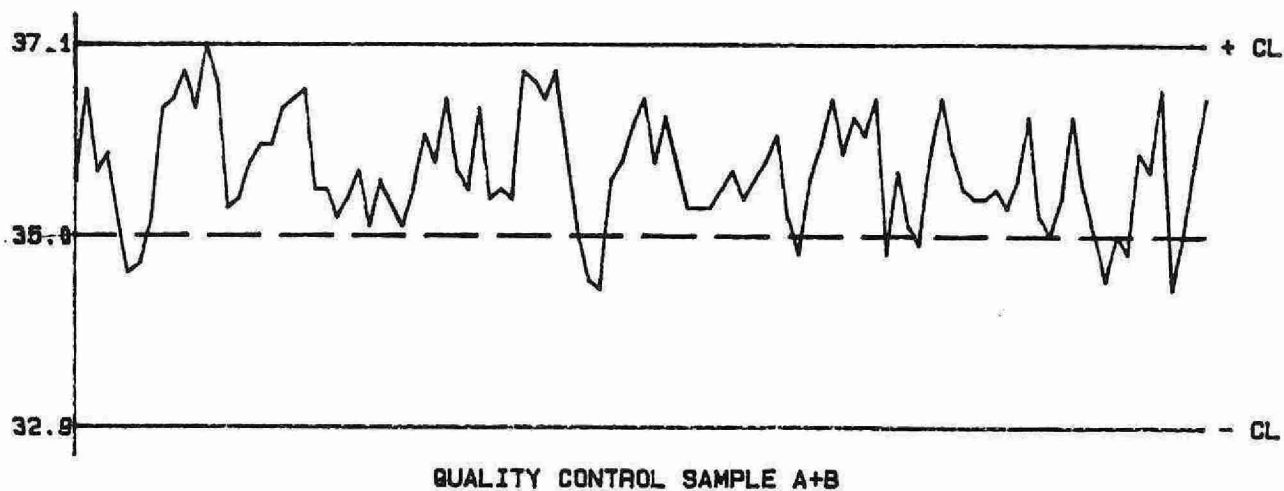
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	83	1.62	3.827

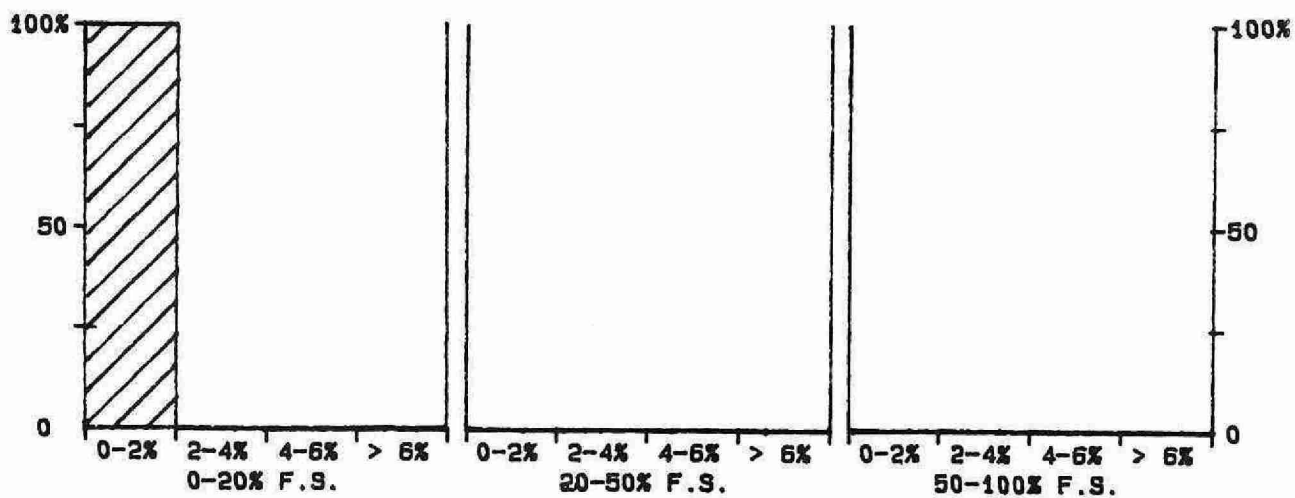
QUALITY CONTROL GRAPHS ACIDITY - TOTAL FIXED ENDPOINT (TFE) (MG/L AS CaCO_3)

FROM: 11/01/88

TO: 28/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



***** ALKALINITY - GRAN *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/07/79
LIS Test Name Code	: ALKTI	Units	: mg/L as CaCO ₃
Work Station Code	: DOT	Unit Code	: 064915
Method Code	: 0905T6	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation, Groundwaters		

SAMPLING:

Quantity Required : 150 mL
Container : 250 ml Amber polyethylene bottle filled to the brim;
screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH <3.7. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. Data are subjected to Gran analysis.

N.B. pH is determined simultaneously.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data reduction software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Drift : 2 standard buffers - 2 times daily

ALKALINITY-GRAN (DOT)
QUALITY CONTROL DATA FROM 05/01/88 TO 29/12/88

Lab: Dorset

Analytical Range: - to 25.00 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	187	20.00	20.02	0.02	0.336
b :	187	5.00	4.75	-0.25	0.187
a+b :	187	25.00	24.76	-0.24	0.451
a-b :	187	15.00	15.27	0.27	0.305

s.d.(AB): Sw(within run): 0.216 S(between runs): 0.272 S/Sw: 1.26

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.28 to 26.72 for A+B
 13.85 to 16.15 for A-B

DUPLICATES:

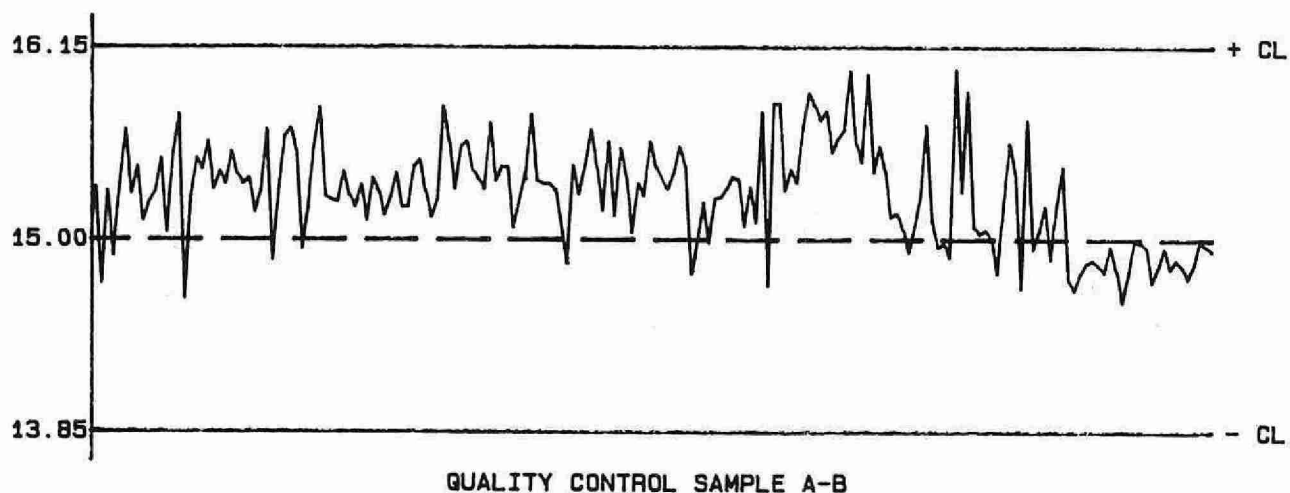
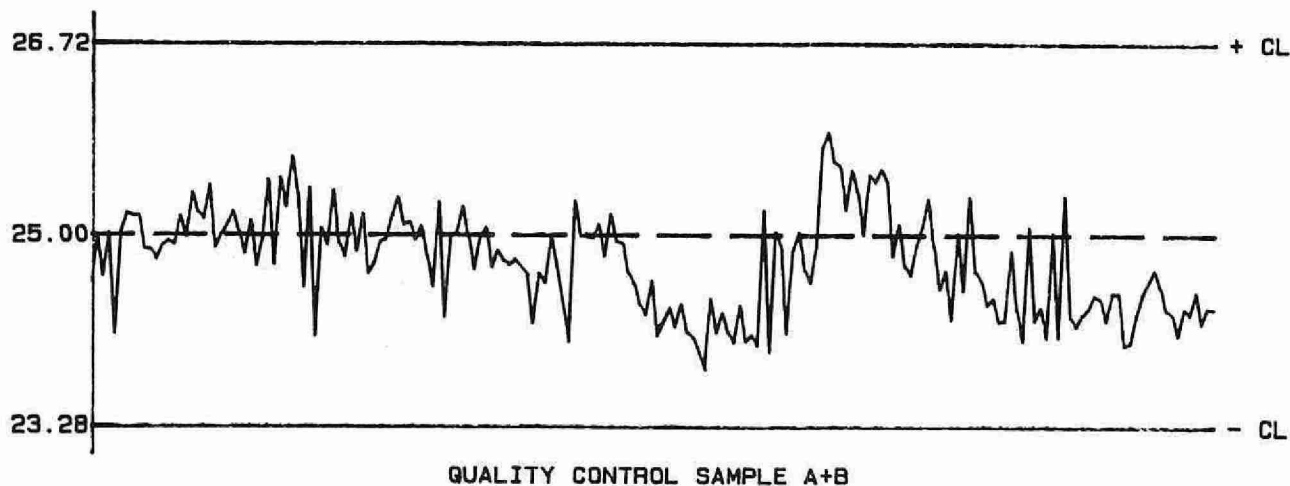
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
134	0.00 - 2.00	0.091	8.3
205	2.00 - 5.00	0.134	3.8
79	5.00 - 10.00	0.137	1.9
35	10.00 - 25.00	0.566	3.5
453	Overall	0.196	N/A

OTHER CHECKS:

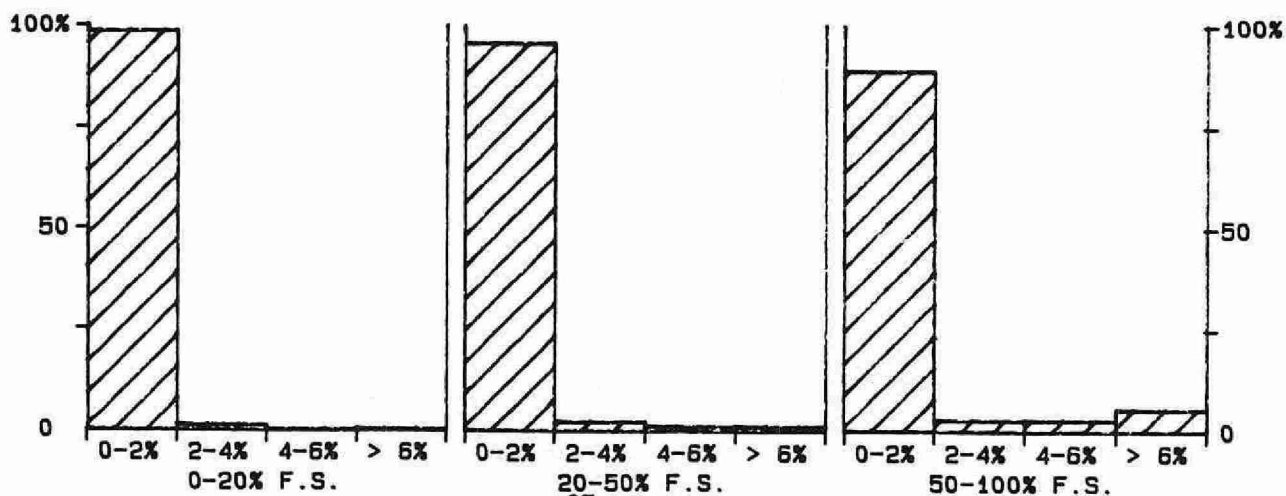
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	176	-0.35	0.293

QUALITY CONTROL GRAPHS ALKALINITY-GRAN (DOT) (MG/L AS CaCO_3)

FROM: 05/01/88
TO: 29/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 25 MG/L AS CaCO_3

***** ALKALINITY - GRAN *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKTI	Units	: mg/L as CaCO ₃
Work Station Code	: RATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: F. Lo
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Polyethylene bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.02 N sulphuric acid to pH <4.0. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. Data are subjected to Gran analysis.

N.B. pH, total fixed endpoint alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: N/A T value: N/A

CALIBRATION:

2 standard buffers covering the pH range 4 to 7

CONTROLS:

Calibration : LTBL plus two standards, e.g. QCA
Drift : In run standards throughout the run (diluted tap water 20% V/V)

MODIFICATIONS:

02/03/84 -QC program was expanded to include pH and total fixed endpoint alkalinity; preparation and storage of QC solutions was modified.

16/03/84 -Use of 4 oz. polyethylene bottles plus screw caps with cone-shaped liners was recommended for sampling.

09/05/85 -RATS - River Automated Titration System - designed for the determination of conductivity, pH, alkalinity-total fixed endpoint and alkalinity-Gran. The system is microcomputer controlled with data reduction and direct computer input (DCI) capabilities.

ALKALINITY-GRAN-RATS
QUALITY CONTROL DATA FROM 08/01/88 TO 13/12/88

Lab: Titration

Analytical Range: - to 25.00 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
c :	64	10.00	9.95	-0.05	0.185
d :	64	2.50	2.52	0.02	0.147
c+d :	64	12.50	12.47	-0.03	0.287
c-d :	64	7.50	7.43	-0.07	0.170

s.d.(CD): Sw(within run): 0.120 S(between runs): 0.167 S/Sw: 1.39

On any given day the calibration is accepted if the values obtained lie within the ranges:

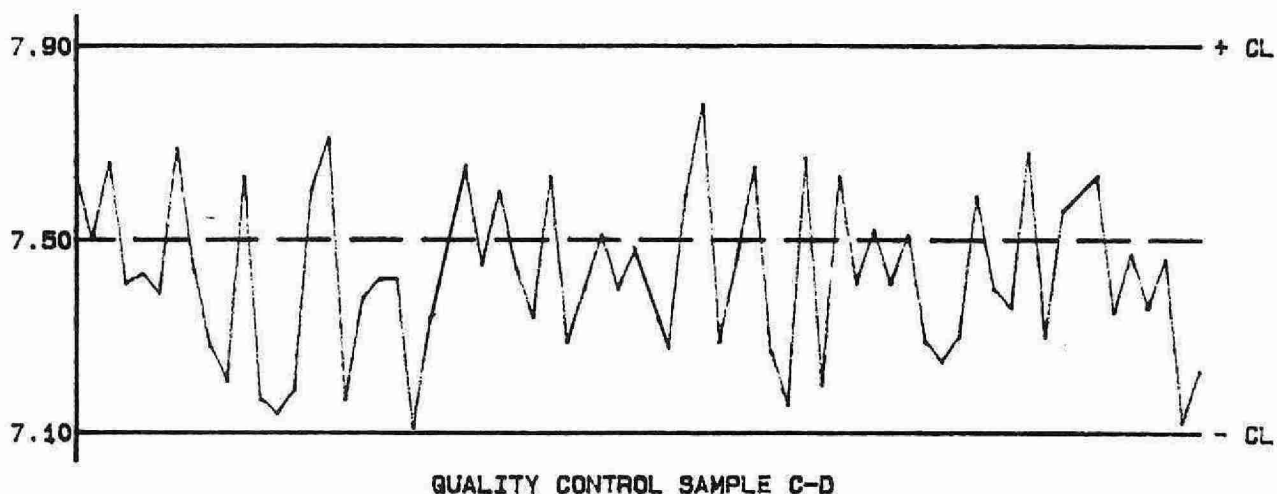
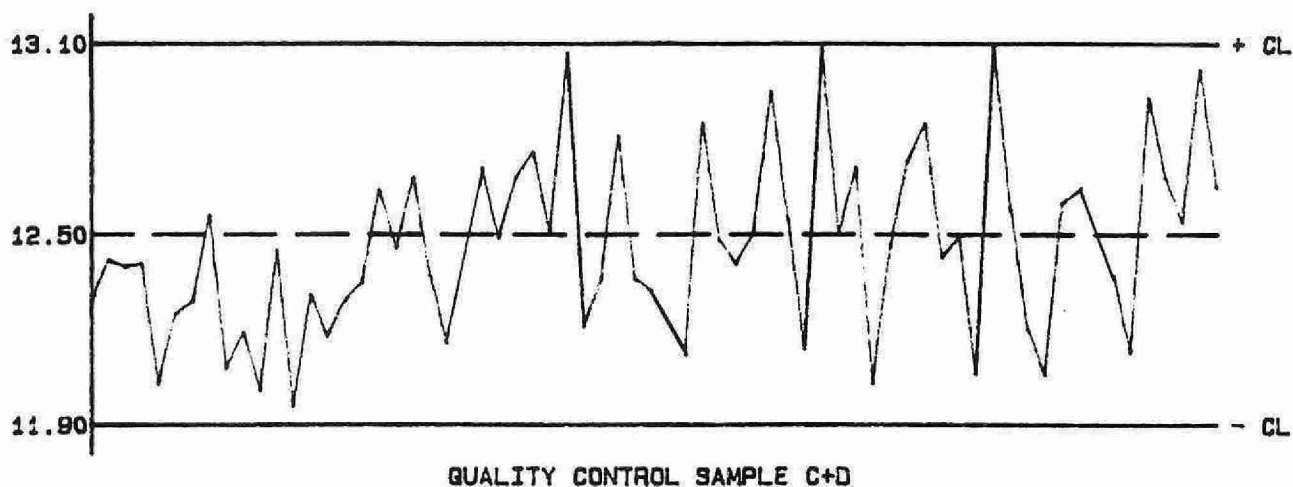
11.90 to 13.10 for C+D
 7.10 to 7.90 for C-D

DUPLICATES:

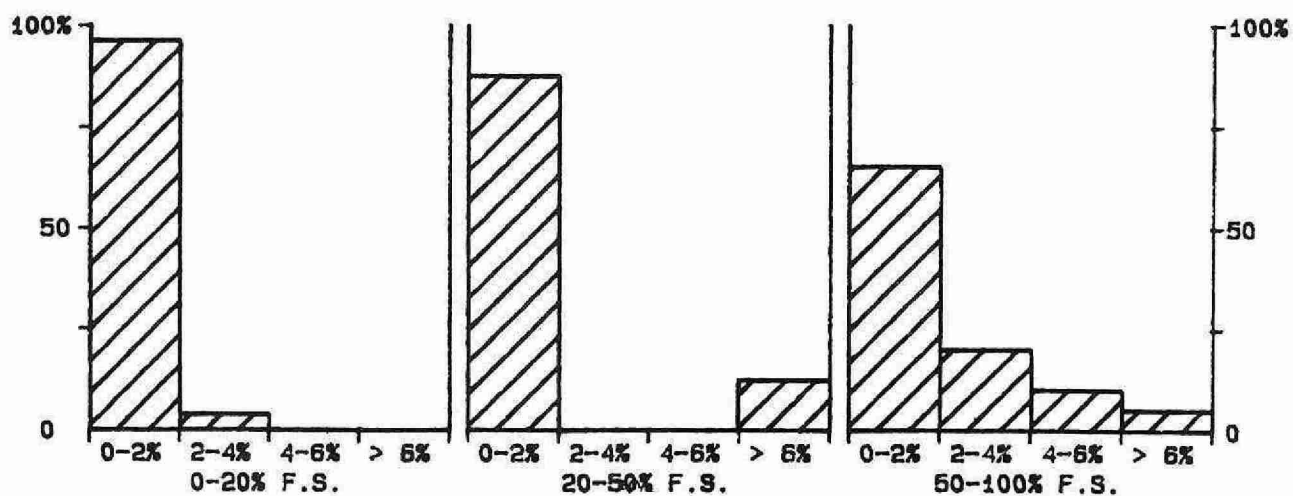
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
0	2.00 - 0.00	N/A	N/A
0	0.00 - 2.00	N/A	N/A
18	2.00 - 5.00	0.184	6.2
8	5.00 - 10.00	0.419	5.6
8	10.00 - 25.00	0.171	0.8
34	Overall	0.257	N/A

QUALITY CONTROL GRAPHS ALKALINITY-GRAN-RATS (MG/L AS CAC03)

FROM: 08/01/88
TO: 13/12/88



— EXPECTED VALUE
— CONTROL LIMIT (CL)



-30-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 25 MG/L AS CAC03

***** ALKALINITY - TOTAL FIXED ENDPOINT *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: RATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: F. Lo
Sample Type/Matrix	: Rivers, Lakes, Precipitation		

SAMPLING:

Quantity Required : 50 mL
Container : Polyethylene bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.02 N sulphuric acid to pH <4.0. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

N.B. pH, gran alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

2 standard buffers covering the pH range 4 to 7

CONTROLS:

Calibration : 4 standards, e.g. QCA
Drift : In run standards throughout the run (diluted tap water 20% V/V)

MODIFICATIONS:

02/03/84 -QC program was expanded to include pH and total fixed endpoint alkalinity; preparation and storage of QC solutions was modified.

16/03/84 -Use of 4 oz. polyethylene bottles plus screw caps with cone-shaped liners was recommended for sampling.

09/05/85 -RATS - River Automated Titration System - designed for the determination of conductivity, pH, alkalinity-total fixed endpoint and alkalinity-Gran. The system is microcomputer controlled with data reduction and direct computer input (DCI) capabilities.

ALKALINITY-TOTAL FIXED ENDPOINT-RATS
QUALITY CONTROL DATA FROM 07/01/88 TO 16/12/88

Lab: Titration

Analytical Range: - to 1000 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	129	250.0	250.2	0.2	1.46
b :	129	50.0	49.7	-0.3	0.99
a+b :	129	300.0	299.9	-0.1	2.06
a-b :	129	200.0	200.6	0.6	1.41
c :	129	10.00	9.95	-0.05	0.209
d :	129	2.50	2.53	0.03	0.146
c+d :	129	12.50	12.48	-0.02	0.309
c-d :	129	7.50	7.42	-0.08	0.184

s.d.(AB): Sw(within run): 1.00 S(between runs): 1.25 S/Sw: 1.25
s.d.(CD): Sw(within run): 0.130 S(between runs): 0.180 S/Sw: 1.39

On any given day the calibration is accepted if the values obtained lie within the ranges:

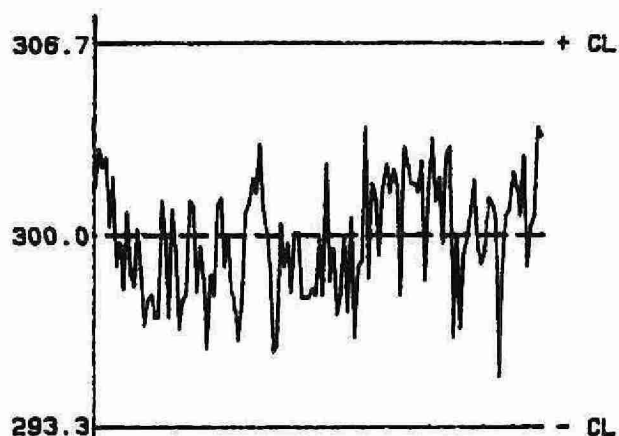
293.3 to 306.7 for A+B
195.5 to 204.5 for A-B
11.60 to 13.40 for C+D
6.90 to 8.10 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	37	0.00 - 10.00	0.307	6.8
	34	10.0 - 25.0	0.54	3.1
	66	25.0 - 100.0	0.47	0.6
	171	100 - 500	0.8	0.5
	0	500 - 1000	N/A	N/A
	308	Overall	0.7	N/A

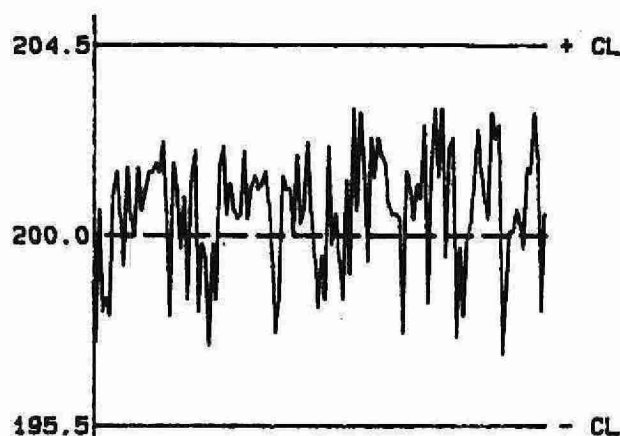
QUALITY CONTROL GRAPHS ALKALINITY-TOTAL FIXED ENDPOINT-RATS (MG/L AS CaCO_3)

FROM: 07/01/88

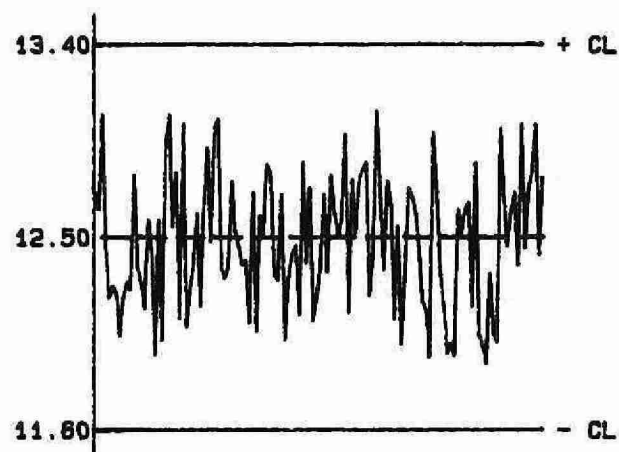
TO: 16/12/88



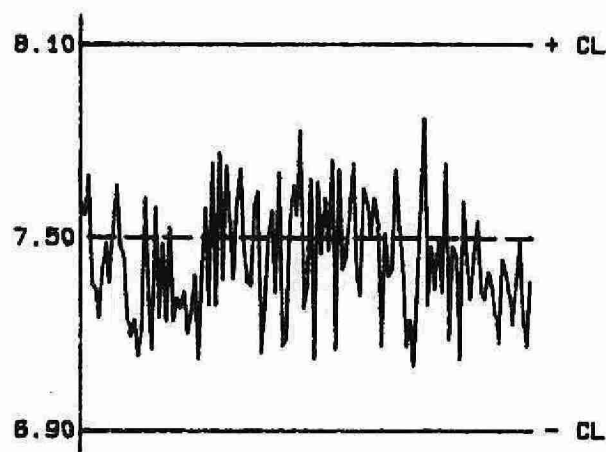
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

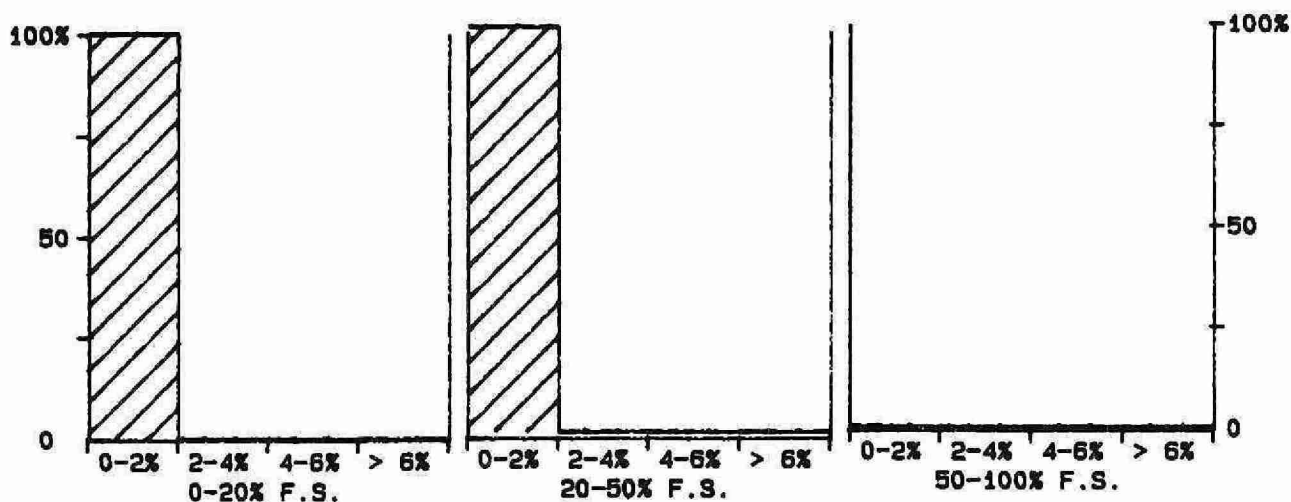


QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

--- EXPECTED VALUE
 — CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
 FULL SCALE VALUE (F.S.): 1000 MG/L AS CaCO_3

***** ALKALINITY - TOTAL FIXED ENDPOINT *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: WATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: F. Lo
Sample Type/Matrix	: Domestic Waters, Sewage, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.020 N sulphuric acid to pH endpoint of 4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

N.B. pH, gran alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

2 standard buffers covering the pH range 4 to 7

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : In run standards throughout the run (diluted tap water 50% V/V)

MODIFICATIONS:

04/03/86 -WATS workstation was introduced. This system was designed to determine pH, conductivity and total fixed endpoint alkalinity; it is microcomputer controlled and has direct computer (DCI) capabilities.

ALKALINITY-TOTAL FIXED ENDPOINT-WATS
QUALITY CONTROL DATA FROM 04/01/88 TO 28/12/88

Lab: Titration

Analytical Range: - to 1000 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	125	250.0	251.2	1.2	1.87
b :	125	100.0	101.1	1.1	1.62
a+b :	125	350.0	352.3	2.3	2.90
a-b :	125	150.0	150.1	0.1	1.95
c :	127	100.00	100.22	0.22	1.634
d :	127	25.00	24.87	-0.13	0.545
c+d :	127	125.00	125.09	0.09	2.066
c-d :	127	75.00	75.35	0.35	1.289

s.d.(AB): Sw(within run): 1.38 S(between runs): 1.75 S/Sw: 1.27
s.d.(CD): Sw(within run): 0.911 S(between runs): 1.218 S/Sw: 1.34

On any given day the calibration is accepted if the values obtained lie within the ranges:

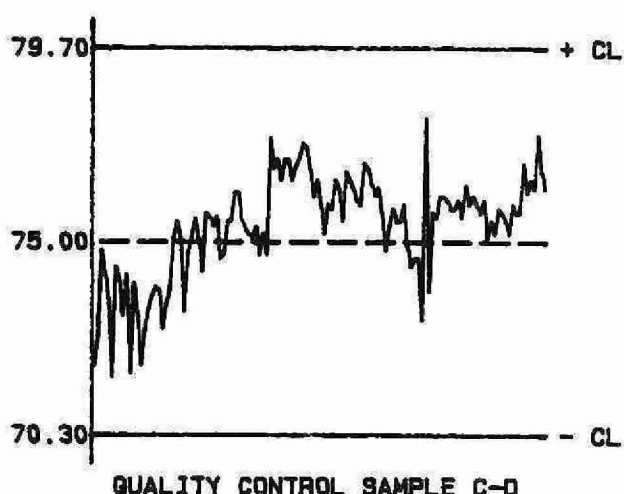
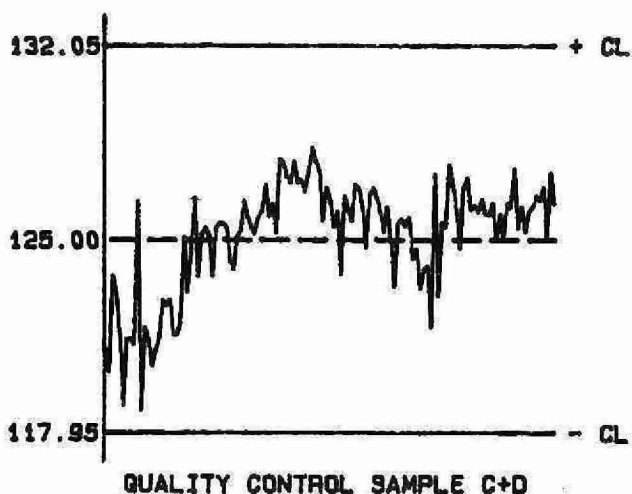
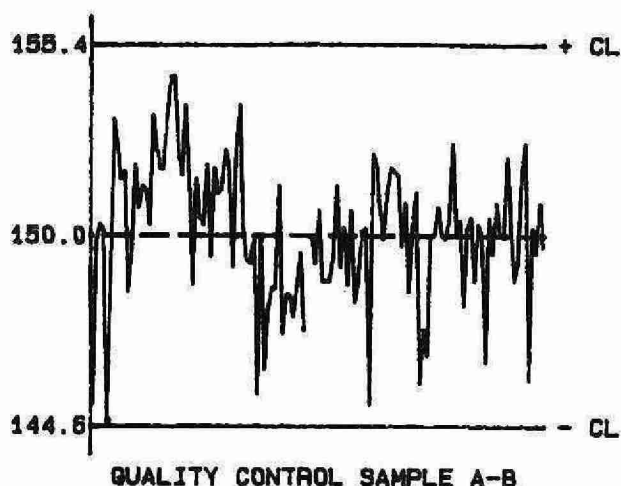
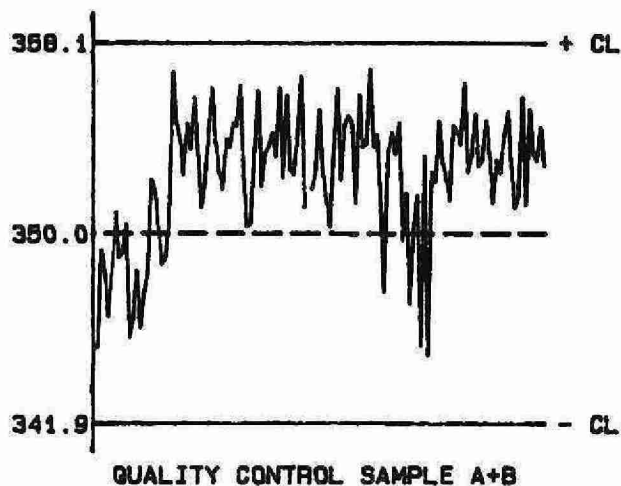
341.9 to 358.1 for A+B
144.6 to 155.4 for A-B
117.95 to 132.05 for C+D
70.30 to 79.70 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	12	0.00 - 10.00	0.598	8.8
	24	10.00 - 25.00	0.586	2.9
	108	25.0 - 100.0	1.21	1.7
	197	100.0 - 500.0	3.80	1.6
	3	500 - 1000	1.6	0.3
	344	Overall	3.0	N/A

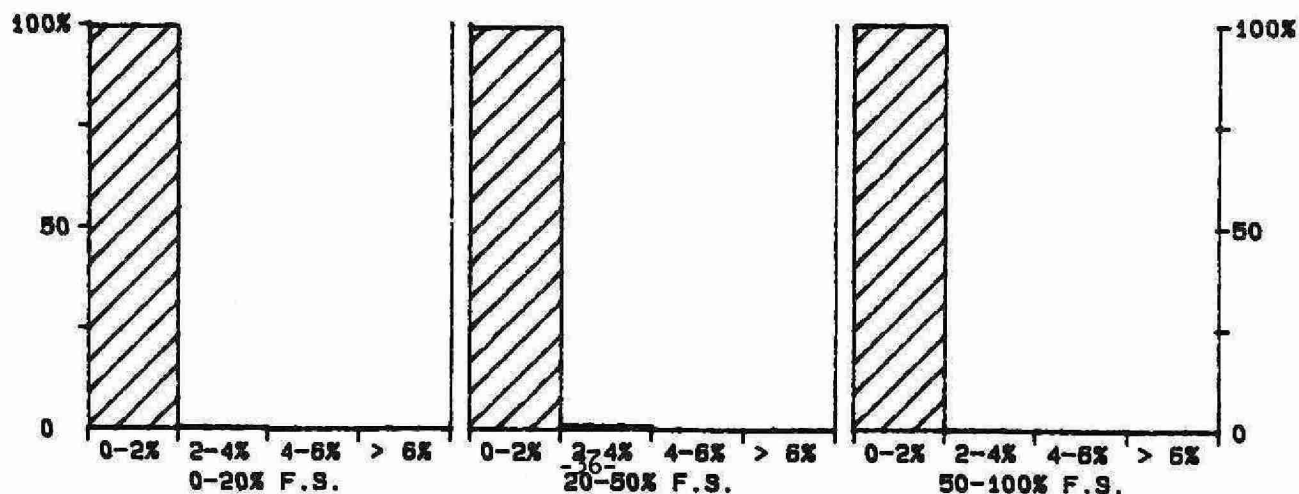
QUALITY CONTROL GRAPHS

FROM: 04/01/88
TO: 28/12/88

ALKALINITY-TOTAL FIXED ENDPPOINT-WATS (MG/L AS CaCO3)



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1000 MG/L AS CaCO3

***** ALKALINITY - TOTAL FIXED ENDPOINT *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: Before 1980
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: WQSDIRT	Unit Code	: 064915
Method Code	: 003MT3	Supervisor	: F. Lo
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are pipetted manually (50.0 mL) and titrated with 0.020 N sulphuric acid to pH endpoint of 4.5.
N.B. Analysis is performed on the supernatant or filtrate.

INSTRUMENTATION:

Automated modular titration system .

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

2 standard buffers covering the pH range 4 to 7

CONTROLS:

Calibration : BL plus 2 standards, e.g. QCA

MODIFICATIONS:

20/05/87 -Introduced workstation to Titration lab.
09/05/89 -Mettler DL20 autotitration system replaced Fisher autotitration system.

ALKALINITY-WQSDIRT
QUALITY CONTROL DATA FROM 05/01/88 TO 12/12/88

Lab: Titration

Analytical Range: - to 1000 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	69	570.0	570.2	0.2	2.77
b :	69	114.0	115.6	1.6	1.45
a+b :	69	684.0	685.8	1.8	3.52
a-b :	69	456.0	454.6	-1.4	2.68

s.d.(AB): Sw(within run): 1.90 S(between runs): 2.21 S/Sw: 1.17

On any given day the calibration is accepted if the values obtained lie within the ranges:

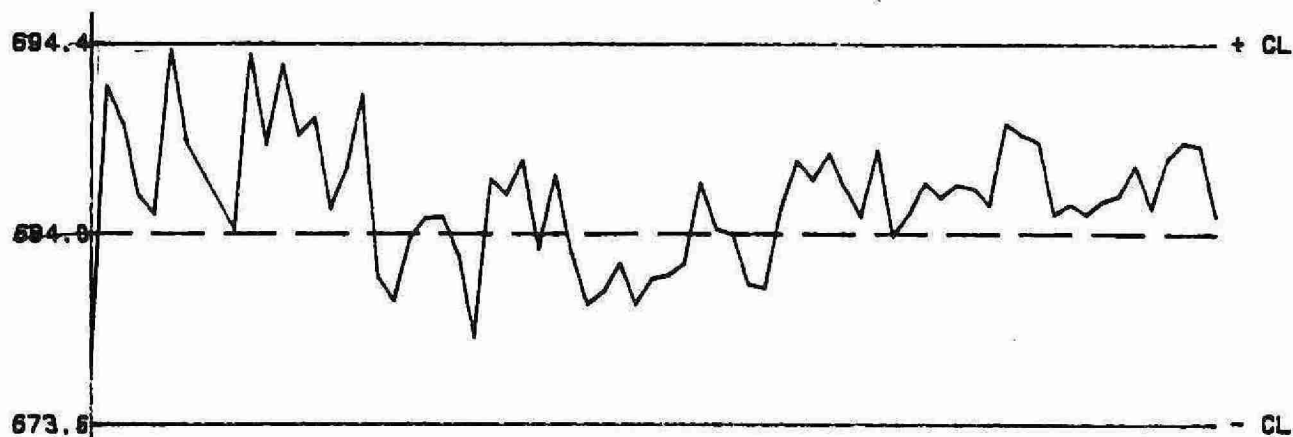
673.6 to 694.4 for A+B
 449.1 to 462.9 for A-B

DUPLICATES:

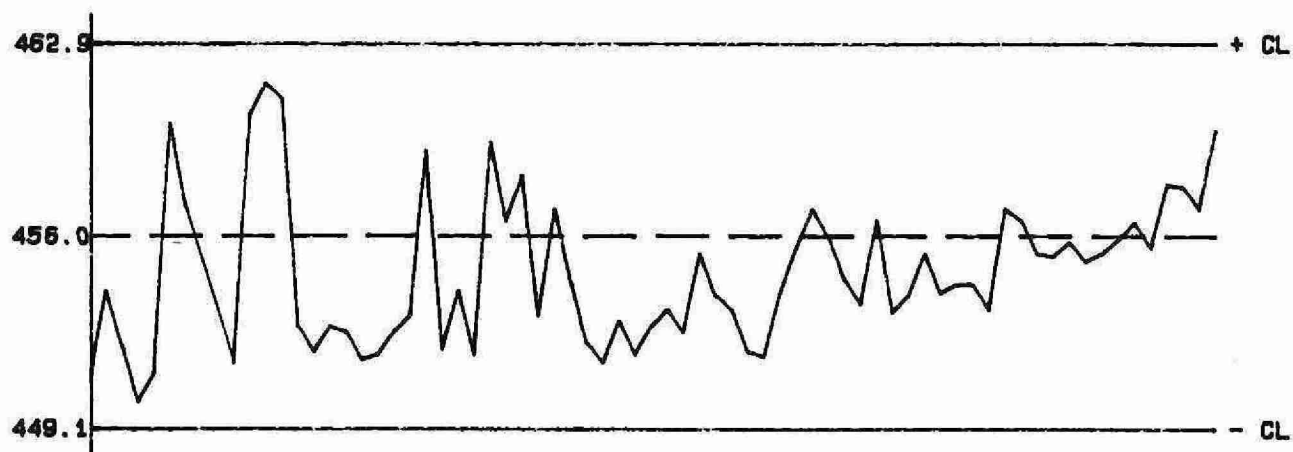
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
23	0.0 - 100.0	2.38	6.1
21	100.0 - 200.0	0.96	0.6
67	200.0 - 400.0	4.95	1.3
17	400.0 - 750.0	9.45	1.7
5	750 - 1000	3.0	0.4
133	Overall	5.0	N/A

QUALITY CONTROL GRAPHS ALKALINITY WQSDIRT (MG/L AS CaCO₃)

FROM: 05/01/88
TO: 12/12/88

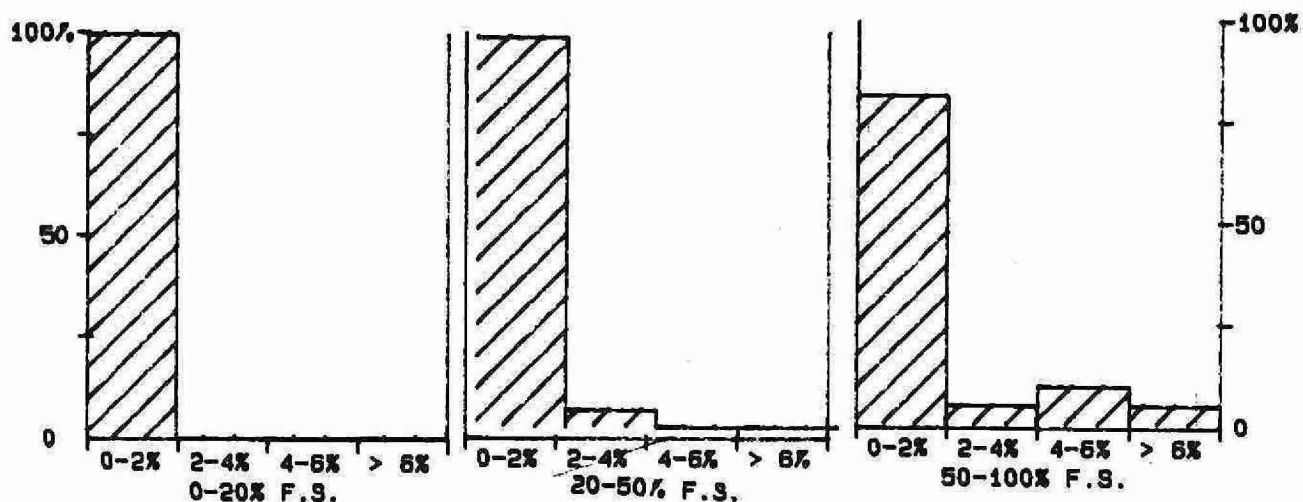


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1000 MG/L AS CaCO₃

***** ALKALINITY - TFE @ PH 4.5 *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/07/79
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: DOT	Unit Code	: 064915
Method Code	: 0905T3	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation, Groundwaters		

SAMPLING:

Quantity Required : 150 mL
Container : 250 ml Amber polyethylene bottle filled to the brim;
screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH 4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Drift : 2 standard buffers - 2 times daily

TOTAL FIXED 4.5 - DOT
QUALITY CONTROL DATA FROM 05/01/88 TO 29/12/88

Lab: Dorset

Analytical Range: - to 80.00 mg/l as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	191	22.00	21.76	-0.24	0.443
b :	191	6.50	6.52	0.02	0.267
a+b :	191	28.50	28.28	-0.22	0.646
a-b :	191	15.50	15.24	-0.26	0.343

s.d.(AB): Sw(within run): 0.243 S(between runs): 0.366 S/Sw: 1.51

On any given day the calibration is accepted if the values obtained lie within the ranges:

26.25 to 30.75 for A+B
14.00 to 17.00 for A-B

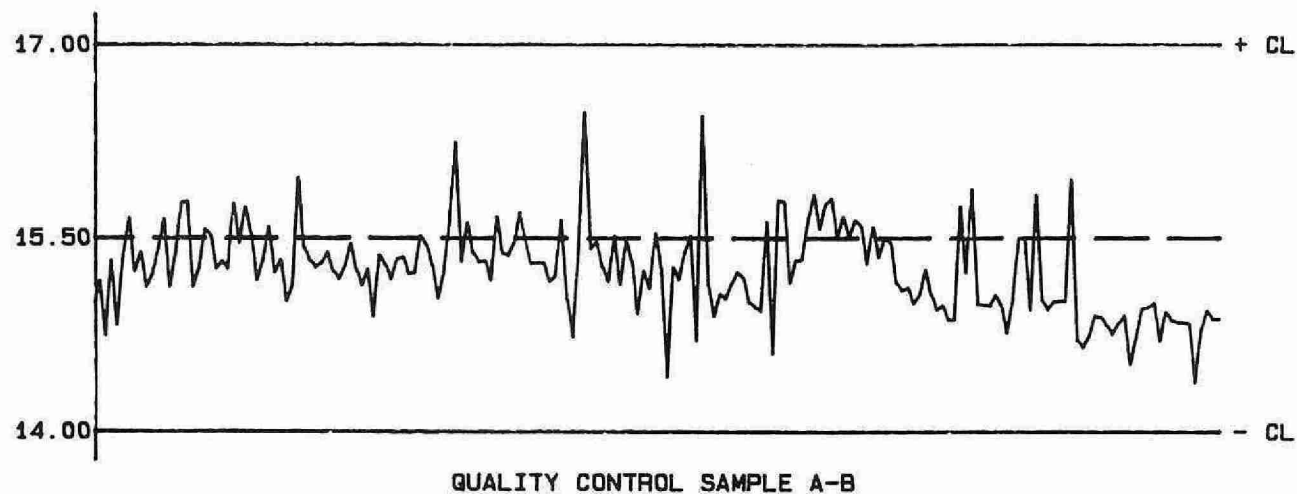
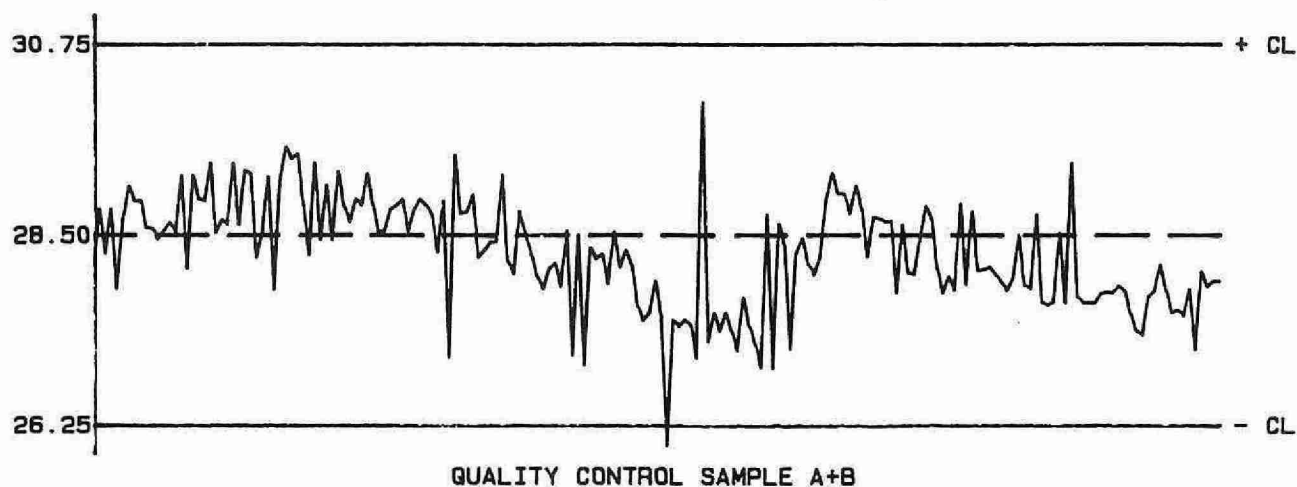
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	411	0.00 - 10.00	0.111	2.4
	37	10.00 - 20.00	0.324	2.4
	17	20.00 - 40.00	0.653	2.8
	8	40.00 - 80.00	0.120	0.2
	473	Overall	0.186	N/A

OTHER CHECKS:

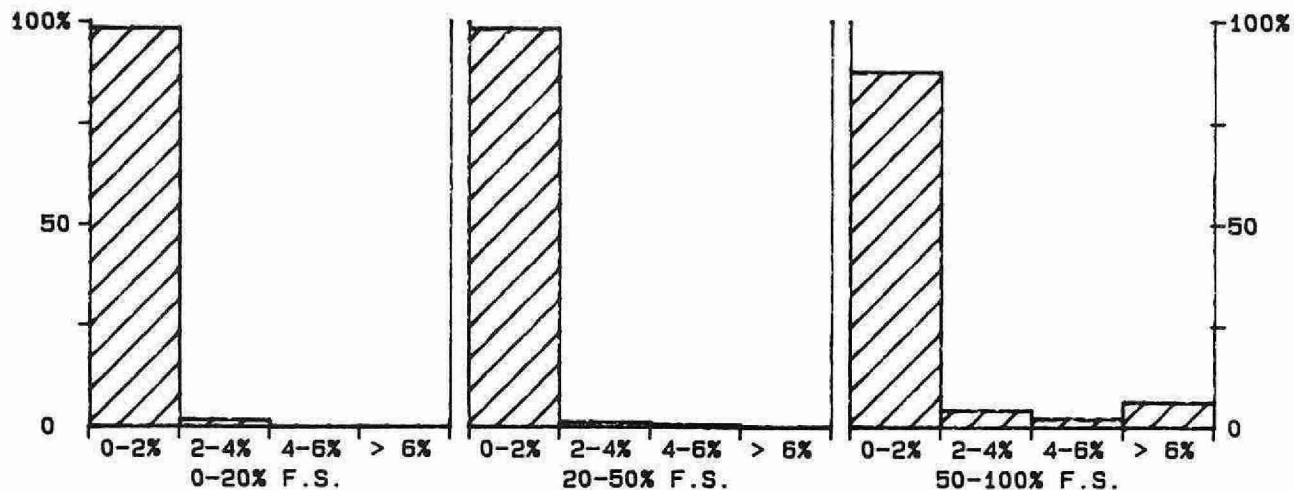
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	178	2	0.6

QUALITY CONTROL GRAPHS TOTAL FIXED 4.5 - DOT (MG/L AS CaCO3)

FROM: 05/01/88
TO: 29/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



***** ALUMINUM - SOIL (Xca) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALECA	Units	: ug/g as Al (dried)
Work Station Code	: DOSOLAL	Unit Code	: 073813
Method Code	: 3144A5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g (dry <2 mm)
Container : Glass jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 10 g sample plus 20 mL 0.01 M calcium chloride is agitated for 5 minutes, centrifuged and filtered. The filtration is analyzed for Al by AAS at 309.3 nm using an NO₂-acetylene flame. Approximate absorbance: 0.1 at the full scale level

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types, two method blanks.
Drift : BBL plus 1 standard (100%) every 10 samples.

MODIFICATIONS:

01/06/86 -Varian 1275AAS replaced Perkin Elmer 403

NOTES:

Values for recoveries are unknown - average value used.

ALUMINUM-SOIL(Xca)
QUALITY CONTROL DATA FROM 21/01/88 TO 03/12/88

Lab: Dorset Soils

Analytical Range: - to 40.0 ug/g as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	30	30.0	29.7	-0.3	0.85
b :	30	10.0	9.8	-0.2	0.75
a+b :	30	40.0	39.5	-0.5	1.26
a-b :	30	20.0	19.9	-0.1	1.00

s.d.(AB): Sw(within run): 0.71 S(between runs): 0.80 S/Sw: 1.13

On any given day the calibration is accepted if the values obtained lie within the ranges:

35.2 to 44.8 for A+B
 16.8 to 23.2 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	27	5.0	5.3	1.00
r2 :	19	16.0	16.1	1.74
r3 :	30	29.0	29.2	2.11

DUPLICATES:

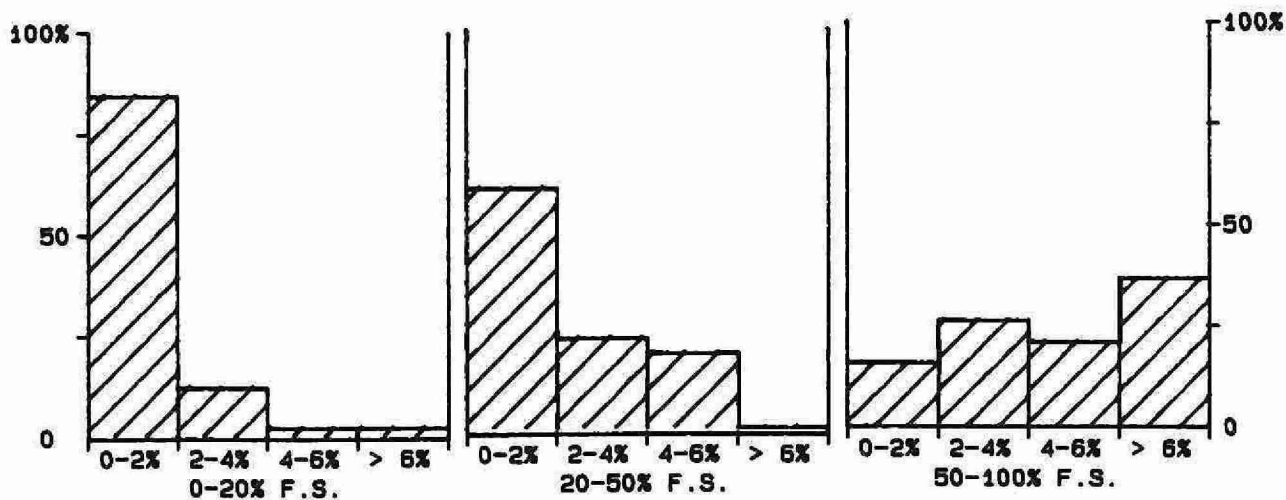
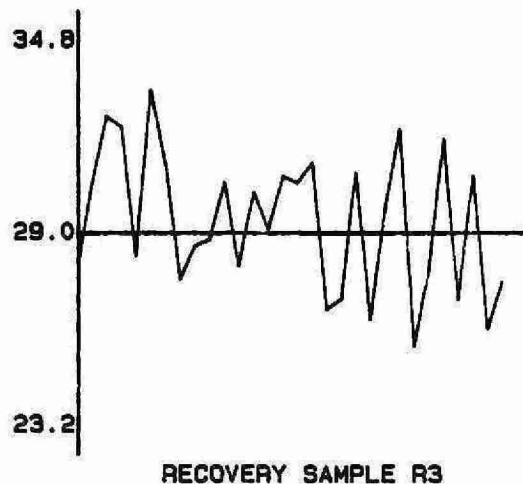
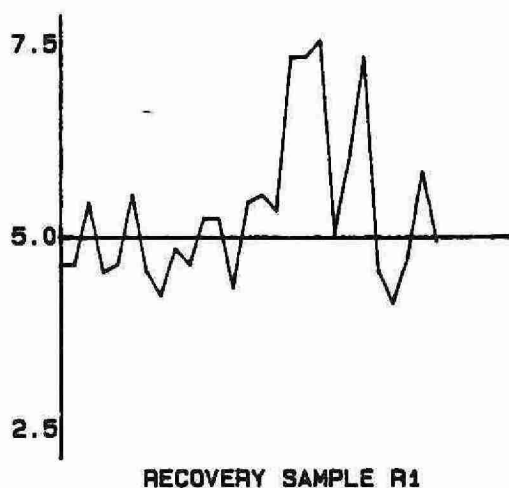
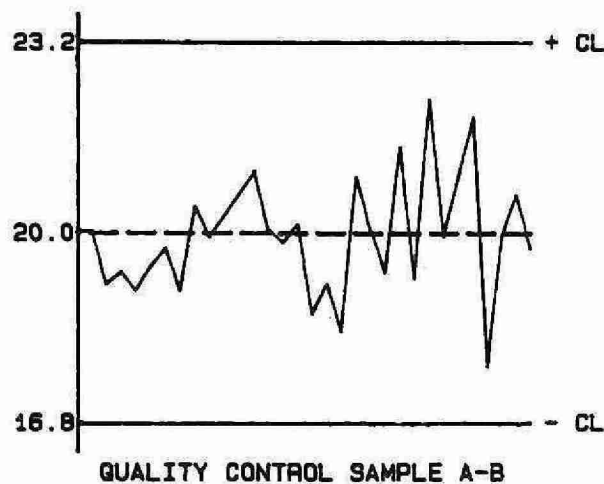
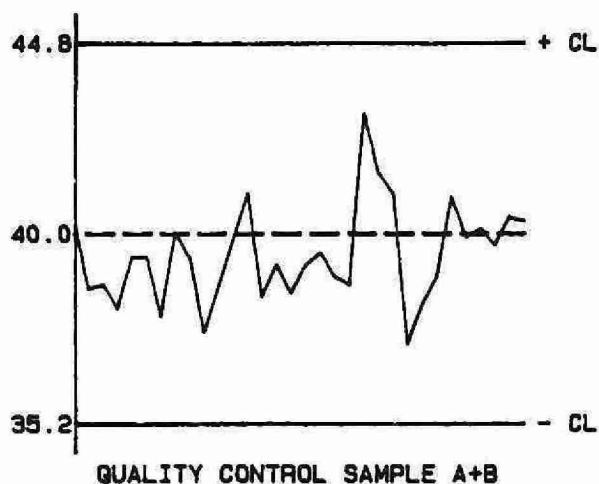
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
59	0.0 - 10.0	0.58	15.3
18	10.0 - 20.0	0.68	4.7
17	20.0 - 40.0	1.86	7.1
94	Overall	0.96	N/A

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	32	0.0	0.04

QUALITY CONTROL GRAPHS ALUMINUM-SOIL (XCA) (UG/G AS AL)

FROM: 21/01/88
TO: 03/12/88



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 40 UG/G AS AL

***** ALUMINUM - CV REACT *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 24/10/85
LIS Test Name Code	: ALEXCV,ALNDCV	Units	: ug/L as Al
Work Station Code	: DOALSP	Unit Code	: 063813
Method Code	: 0928C2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, and Soil Leachates		

SAMPLING:

Quantity Required : 10 mL
Container : PET - 500 ml Jars

ANALYTICAL PROCEDURE:

The procedure is based on the formation of an aluminum catechol-violet complex at pH 6.2. Phenanthroline hydroxylamine HCl reagents are used to reduce interference by iron. An ion exchange column is used for separating organic and inorganic aluminum. Concentrations of aluminum are determined by comparison with a similarly prepared series of standards and reported as ug/L as CV reactive Al.

INSTRUMENTATION:

Automated autoanalyzer/sampler system with colourimeter and chart recorder.

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

BL plus 10 standards daily

CONTROLS:

Calibration : LTBL plus 4 standards, e.g. QCA

ALUMINUM-CV REACT (DOALSP)
QUALITY CONTROL DATA FROM 12/01/88 TO 28/12/88

Lab: Dorset

Analytical Range: - to 1000 ug/L as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	46	750	750	0	6.7
b :	51	250	253	3	4.6
a+b :	46	1000	1003	3	8.2
a-b :	46	500	497	-3	8.1
c :	50	75	76	1	2.1
d :	48	25	27	2	3.4
c+d :	48	100	103	3	4.3
c-d :	48	50	49	-1	3.6

s.d.(AB): Sw(within run): 5.7 S(between runs): 5.7 S/Sw: 1.00
s.d.(CD): Sw(within run): 2.5 S(between runs): 2.8 S/Sw: 1.11

On any given day the calibration is accepted if the values obtained lie within the ranges:

963 to 1037 for A+B
475 to 525 for A-B
85 to 115 for C+D
48 to 60 for C-D

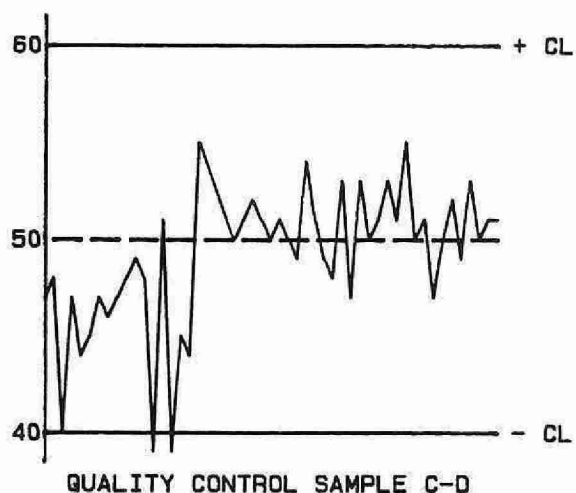
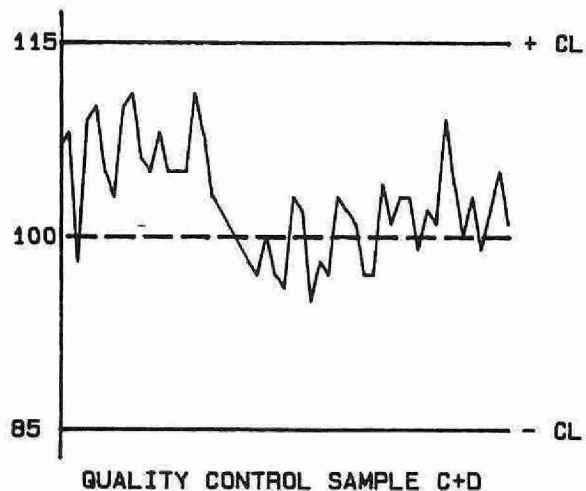
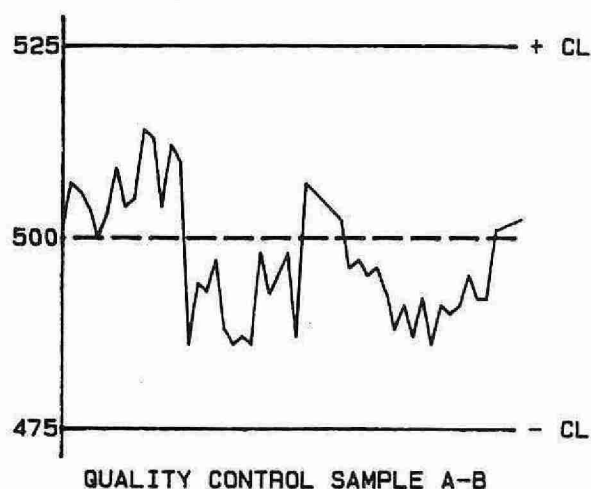
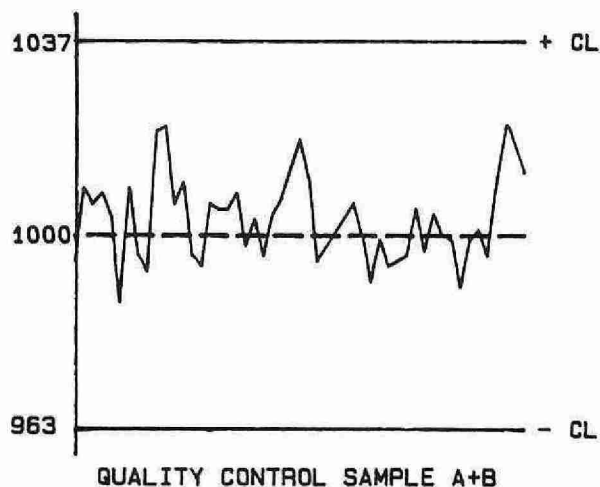
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	75	0 - 50	2.0	10.0
	29	50 - 100	2.3	3.2
	20	100 - 250	13.2	7.7
	14	250 - 500	15.5	4.7
	2	500 - 1000	6.4	1.0
	140	Overall	7.3	N/A

OTHER CHECKS:

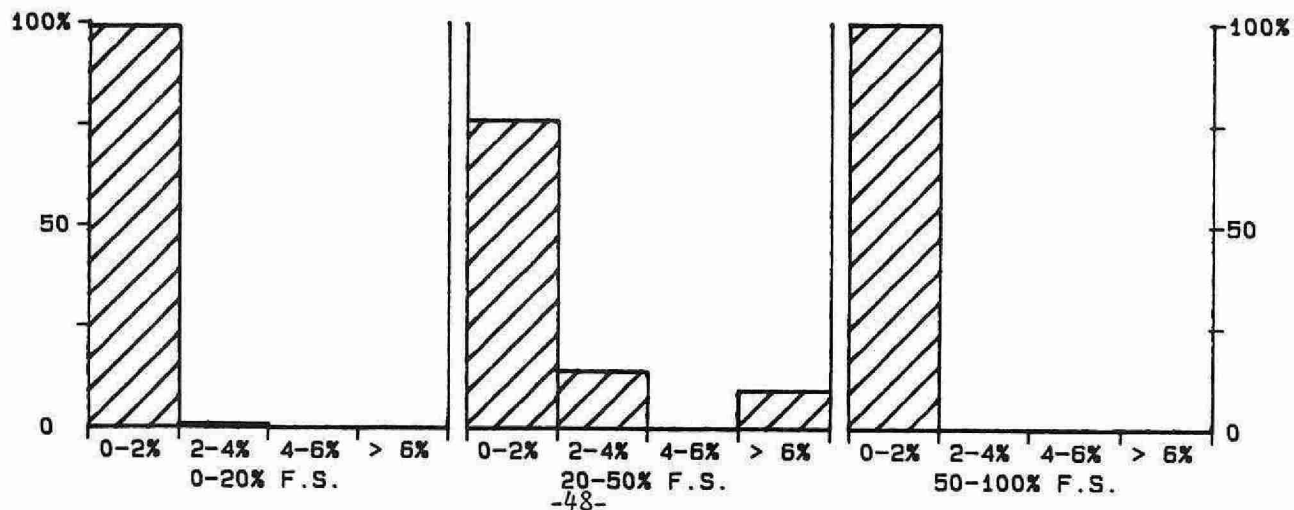
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal :	0	N/A	N/A
Long Term Blank :	51	0	0.0

QUALITY CONTROL GRAPHS ALUMINUM-CV REACT (DOALSP) (UG/L AS AL)

FROM: 12/01/88
TO: 28/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



***** ALUMINUM - SOIL (Xdi) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALEDI	Units	: % by weight Al
Work Station Code	: DOMETDI	Unit Code	: 070813
Method Code	: 301AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.5 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm.

ANALYTICAL PROCEDURE:

Aluminum is extracted from a 0.25 g soil sample using sodium citrate, sodium bicarbonate and sodium dithionite at 80 C (procedure is repeated twice). The sample is washed twice and its washings and extracts are combined and diluted to 50 mL with deionized water. The final solution is analyzed by AAS at 309.3 nm with a NO₂-acetylene flame.

Approximate absorbance: 0.3 at the full scale level

N.B. Iron (and Manganese, when required) is determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples (run occasionally).
Drift : BBL plus 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/06/86 -Varian AA1275 replaced Perkin Elmer 403

NOTES:

Values for recoveries are unknown - average value used.

ALUMINIUM - SOIL (Xd1)
QUALITY CONTROL DATA FROM 07/01/88 TO 06/12/88

Lab: Dorset Soils

Analytical Range: - to 1.00 % as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	35	0.75	0.75	0.00	0.020
b :	35	0.25	0.25	-0.00	0.011
a+b :	35	1.00	1.00	0.00	0.026
a-b :	35	0.50	0.51	0.01	0.019

s.d.(AB): Sw(within run): 0.013 S(between runs): 0.016 S/Sw: 1.20

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.92 to 1.07 for A+B
0.45 to 0.55 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	35	1.00	1.02	0.057
r2 :	35	0.19	0.18	0.018
r3 :	34	0.16	0.17	0.012

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
36	0.00 - 0.20	0.009	8.6
27	0.20 - 0.50	0.015	4.9
28	0.50 - 1.00	0.029	4.2
91	Overall	0.019	N/A

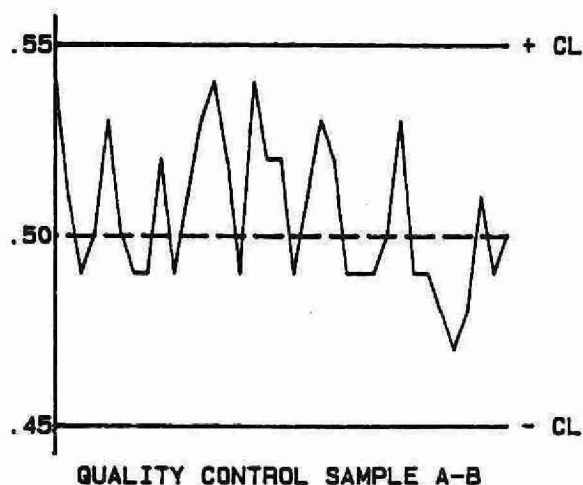
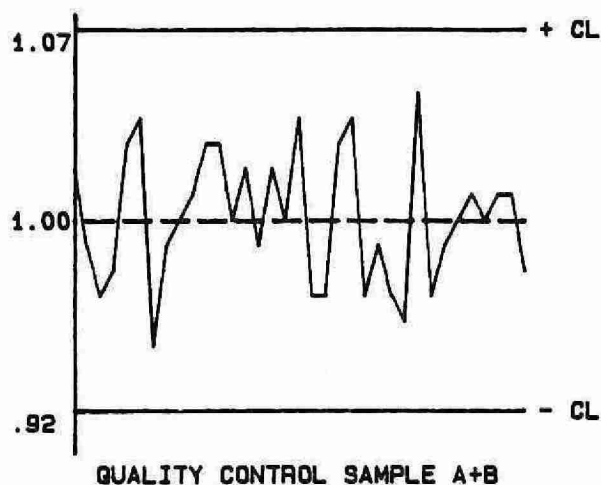
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	35	0.00	0.000

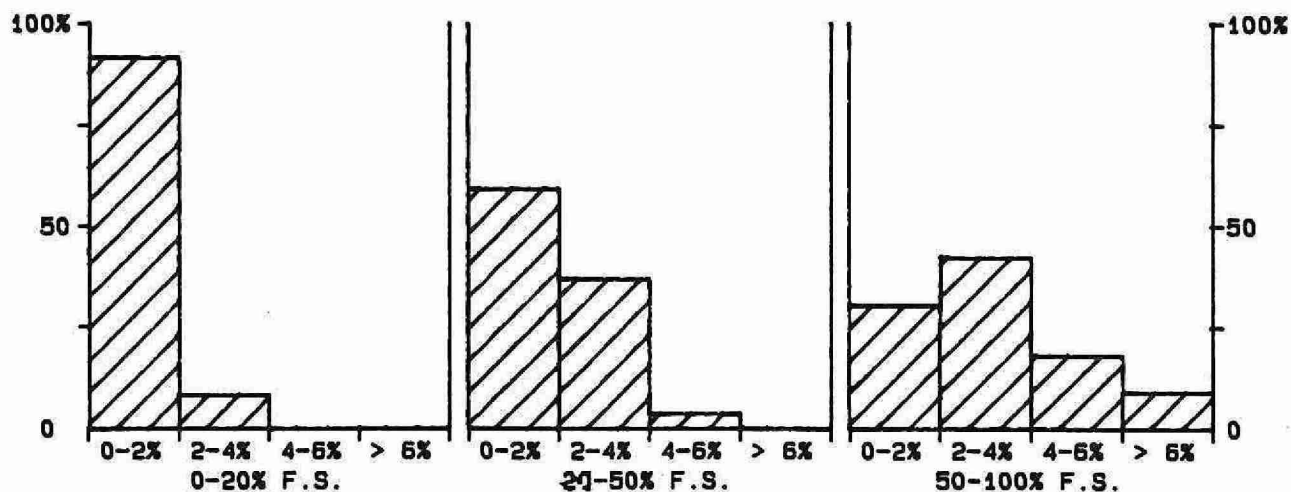
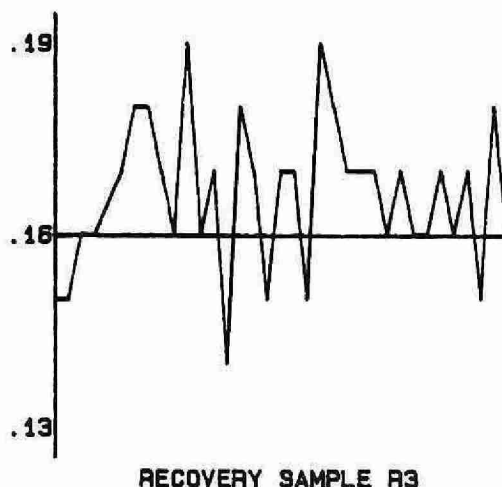
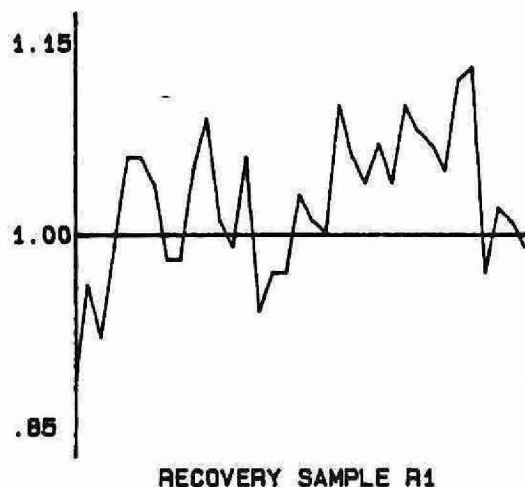
QUALITY CONTROL GRAPHS ALUMINIUM - SOIL (XDI) (% AS AL)

FROM: 07/01/88

TO: 06/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



MANGANESE-SOIL(Xd1)
QUALITY CONTROL DATA FROM 12/01/88 TO 06/12/88

Lab: Dorset Soils

Analytical Range: - to 0.100 % as Mn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	3	0.075	0.075	0.000	0.0000
b :	3	0.025	0.024	-0.001	0.0006
a+b :	3	0.100	0.099	-0.001	0.0006
a-b :	3	0.050	0.051	0.001	0.0006

s.d.(AB): Sw(within run): 0.0004 S(between runs): 0.0004 S/Sw: 1.00

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.085 to 0.115 for A+B
0.040 to 0.060 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	4	0.005	0.005	0.0013
r2 :	4	0.054	0.054	0.0000
r3 :	4	0.001	0.001	0.0008

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
5	0.000 - 0.020	0.0004	44.7
0	0.020 - 0.050	N/A	N/A
1	0.050 - 0.100	N/A	N/A
6	Overall	0.0032	N/A

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	3	0.000	0.0006

NOTE: Due to insufficient data, graphs have been excluded.

***** ALUMINUM - SOIL (Xpy) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALEPY	Units	: % by weight Al
Work Station Code	: DOMETALX	Unit Code	: 070813
Method Code	: 703AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.5 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm.

ANALYTICAL PROCEDURE:

A 0.300 g quantity of sample plus 30 mL of 0.1 M sodium pyrophosphate is agitated overnight in a centrifuge tube. Samples are centrifuged at 20,000 rpm for 15 minutes and the supernatant is analyzed by AAS at 309.3 nm with a NO₂-acetylene flame.
Approximate absorbance: 0.3 at the full scale level
N.B. Iron and manganese may be determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples
Drift : BBL plus 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/06/86 -Varian AA1275 replaced Perkin Elmer 403

NOTES:

Values for recoveries are unknown - average⁵³-value used.

ALUMINUM-SOIL(Xpy)
QUALITY CONTROL DATA FROM 23/02/88 TO 25/09/88

Lab: Dorset Soils

Analytical Range: - to 0.50 % as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	27	0.38	0.37	-0.01	0.011
b :	27	0.13	0.12	-0.00	0.008
a+b :	27	0.50	0.49	-0.01	0.016
a-b :	27	0.25	0.25	-0.00	0.011

s.d.(AB): Sw(within run): 0.008 S(between runs): 0.010 S/Sw: 1.24

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.46 to 0.54 for A+B
0.23 to 0.27 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	30	0.90	0.88	0.055
r2 :	30	0.14	0.13	0.015
r3 :	30	0.16	0.15	0.012

DUPLICATES:

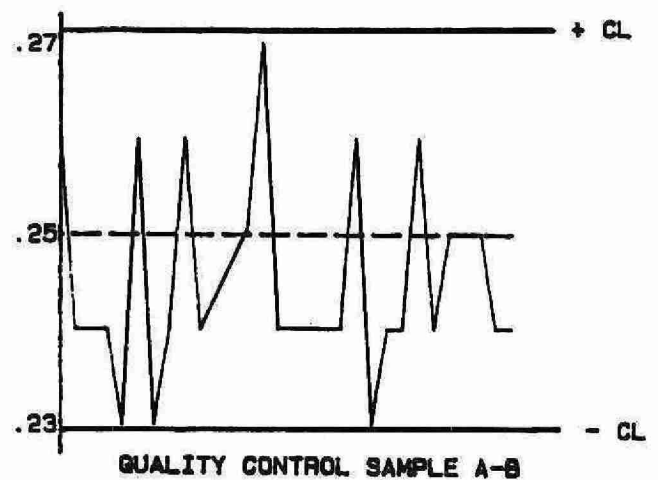
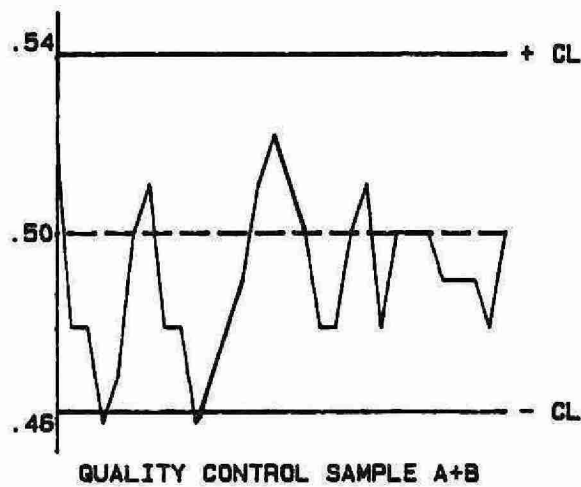
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
24	0.00 - 0.10	0.009	14.0
20	0.10 - 0.25	0.011	6.9
38	0.25 - 0.50	0.021	5.7
82	Overall	0.016	N/A

OTHER CHECKS:

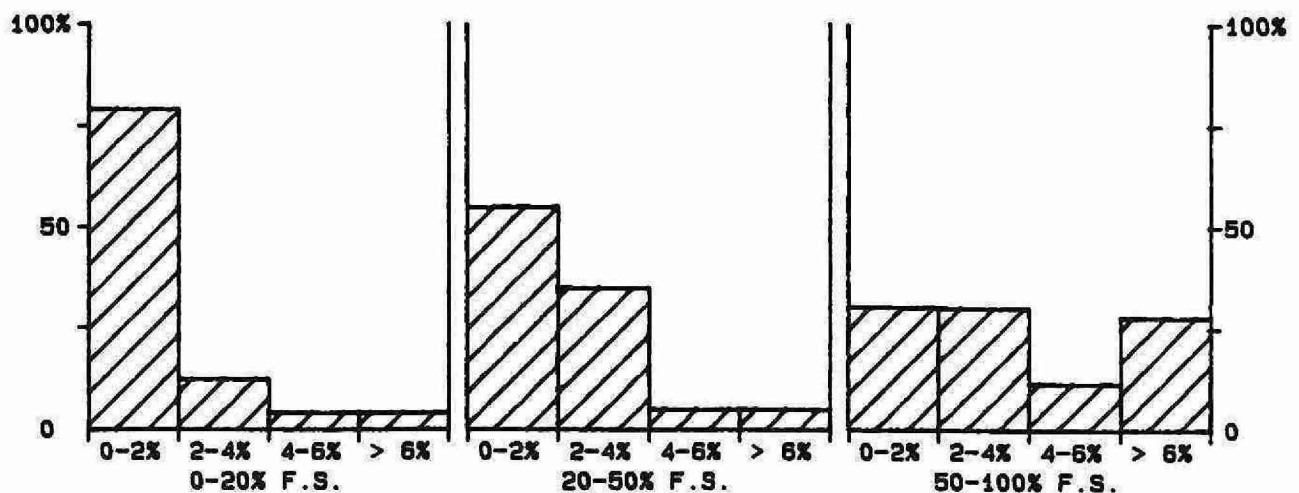
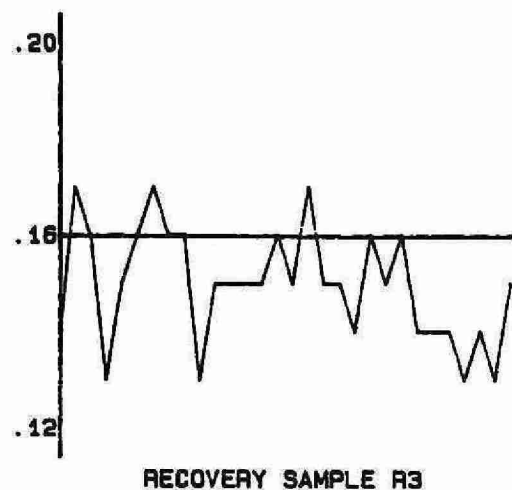
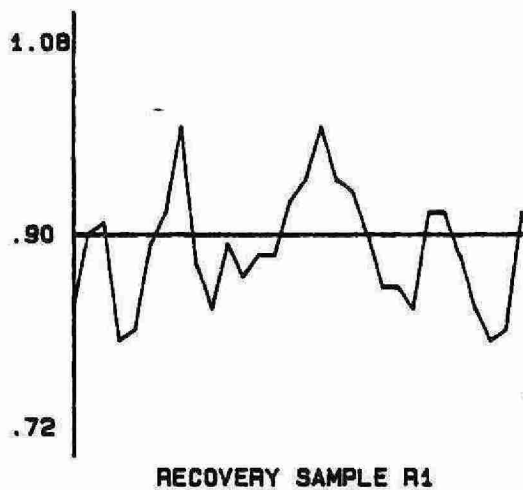
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	30	0.00	0.000

QUALITY CONTROL GRAPHS ALUMINUM-SOIL (XPY) (% AS AL)

FROM: 23/02/88
TO: 25/09/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



MANGANESE-SOILS(Xpy)
QUALITY CONTROL DATA FROM 23/02/88 TO 25/11/88

Lab: Dorset Soils

Analytical Range: - to 0.050 % as Mn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	4	0.037	0.038	0.001	0.0005
b :	4	0.012	0.013	0.000	0.0005
a+b :	4	0.050	0.051	0.001	0.0008
a-b :	4	0.025	0.025	0.001	0.0006

s.d.(AB): Sw(within run): 0.0004 S(between runs): 0.0005 S/Sw: 1.18

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.042 to 0.057 for A+B
0.020 to 0.030 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	4	0.002	0.002	0.0008
r2 :	4	0.011	0.011	0.0014
r3 :	4	0.001	0.001	0.0008

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
5	0.000 - 0.010	0.0005	23.8
0	0.010 - 0.020	N/A	N/A
3	0.020 - 0.050	0.0024	5.4
8	Overall	0.0015	N/A

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	4	0.000	0.0000

NOTE: Due to insufficient data, graphs have been excluded.

***** ALUMINUM - SOIL (Xsc) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALESC	Units	: meq/100 g
Work Station Code	: DOCACTION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 6 g dry
Container : Glass jar

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Al by AAS at 309.3 nm with a NO₂-acetylene flames.

Approximate absorbance: 0.2 at the full scale level.

N.B. Calcium, magnesium, and potassium are determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples (run occasionally).
Drift : BBL plus 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/04/81 -three g sample used for all soil types (6 g previously used for sandy soils)

01/06/86 -Varian AA1275 replaced Perkin Elmer 403

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.

Values for recoveries are unknown - average value used.

ALUMINUM - SOIL (Xsc)
QUALITY CONTROL DATA FROM 06/01/88 TO 16/11/88

Lab: Dorset Soils

Analytical Range: - to 2.50 meq/100g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	28	1.88	1.82	-0.05	0.053
b :	28	0.63	0.62	-0.00	0.036
a+b :	28	2.50	2.45	-0.05	0.073
a-b :	28	1.25	1.20	-0.05	0.053

s.d.(AB): Sw(within run): 0.037 S(between runs): 0.045 S/Sw: 1.21

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.22 to 2.78 for A+B
 1.06 to 1.44 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	17	1.52	1.58	0.152
r2 :	27	0.02	0.01	0.015
r3 :	27	0.02	0.01	0.011

DUPLICATES:

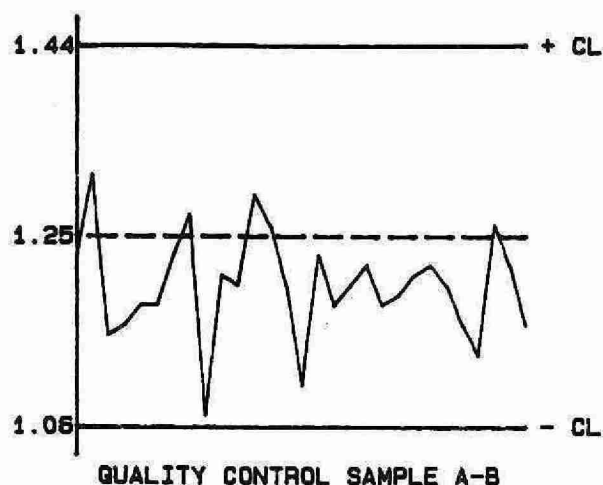
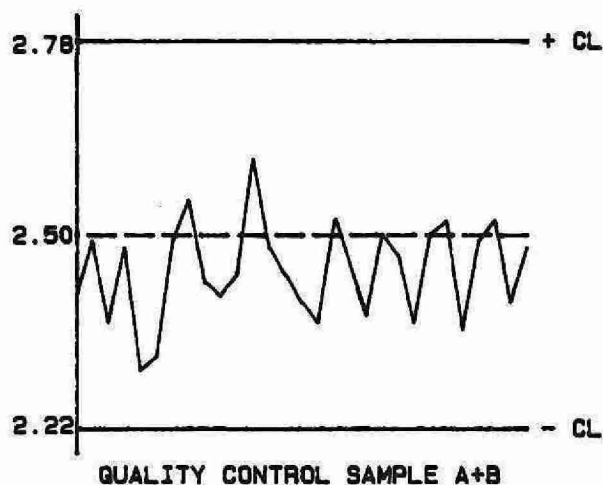
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
42	0.00 - 0.50	0.038	24.1
14	0.50 - 1.25	0.101	13.2
22	1.25 - 2.50	0.109	5.7
78	Overall	0.077	N/A

OTHER CHECKS:

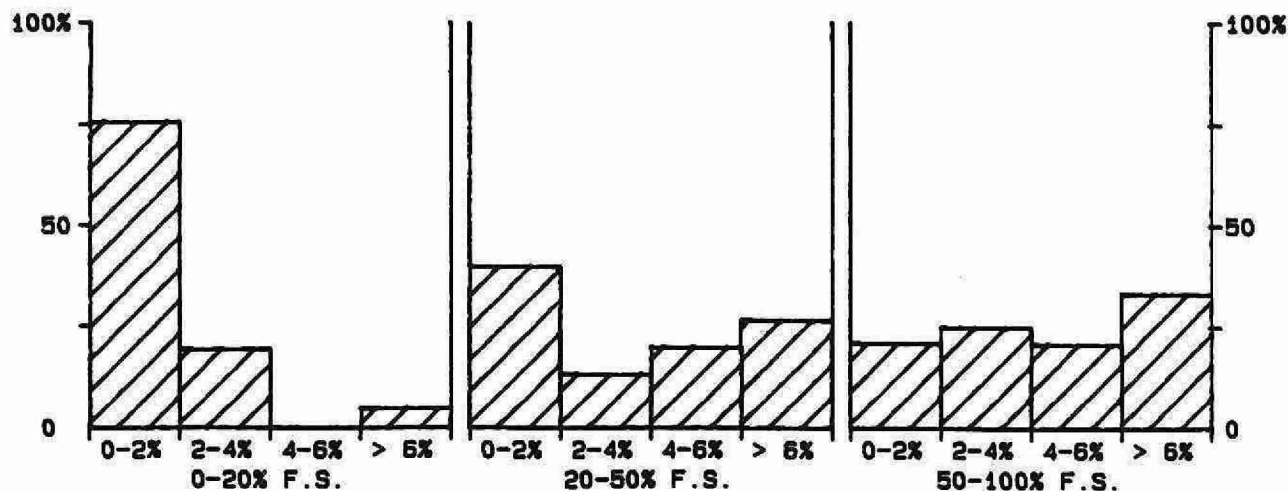
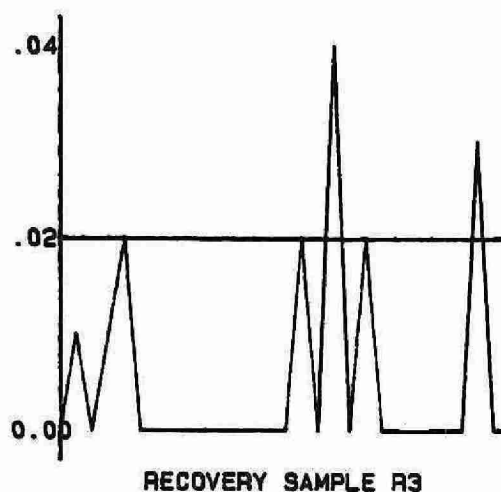
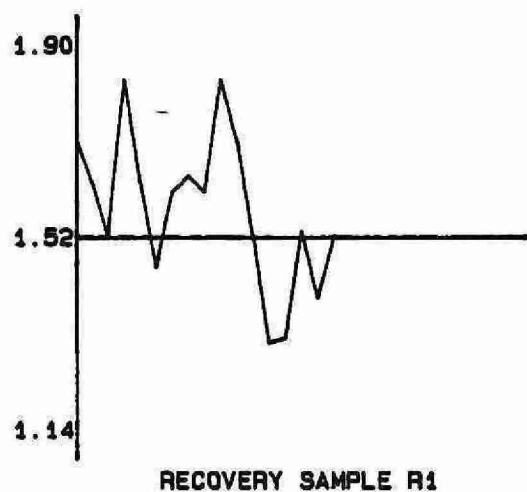
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	29	0.00	0.004

QUALITY CONTROL GRAPHS ALUMINUM - SOIL (XSC) (MEQ/100G)

FROM: 06/01/88
TO: 16/11/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



***** ALUMINUM - TOTAL *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 06/09/83
LIS Test Name Code	: ALUT	Units	: ug/L as Al
Work Station Code	: DOAAS	Unit Code	: 063813
Method Code	: 005AF2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation, Biota and Groundwaters		

SAMPLING:

Quantity Required : 1 mL
Container : 10 ml Polystyrene Tube, capped

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 309.3 nm.
Approximate absorbance: .5 at the full scale level

INSTRUMENTATION:

Automated GFAAS/sampler system with microcomputer data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

BL plus 5 standards daily

CONTROLS:

Calibration : LTBL plus 4 standards, e.g. QCA

TOTAL ALUMINUM (DOAAS)
QUALITY CONTROL DATA FROM 02/02/88 TO 29/12/88

Lab: Dorset

Analytical Range: - to 200 ug/L as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	79	140	137	-3	4.7
b :	79	70	69	-1	3.2
a+b :	79	210	207	-3	6.6
a-b :	79	70	68	-2	4.6
c :	79	35	38	3	2.4
d :	79	7	7	0	1.5
c+d :	79	42	44	2	3.0
c-d :	79	28	31	3	2.6

s.d.(AB): SW(within run): 3.3 S(between runs): 4.0 S/SW: 1.24
s.d.(CD): SW(within run): 1.8 S(between runs): 2.0 S/SW: 1.09

On any given day the calibration is accepted if the values obtained lie within the ranges:

180 to 240 for A+B
50 to 90 for A-B
27 to 57 for C+D
18 to 38 for C-D

DUPLICATES:

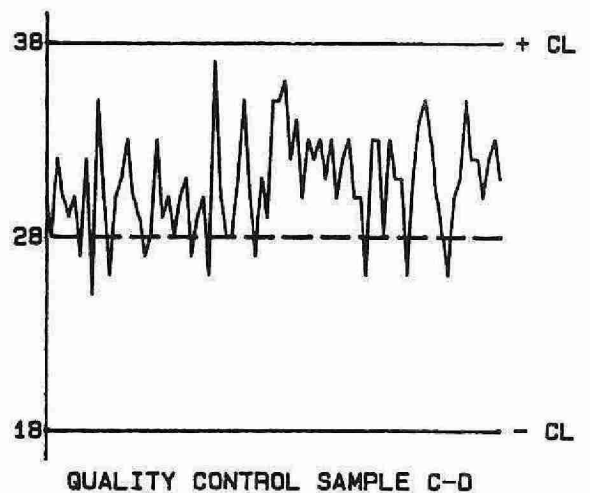
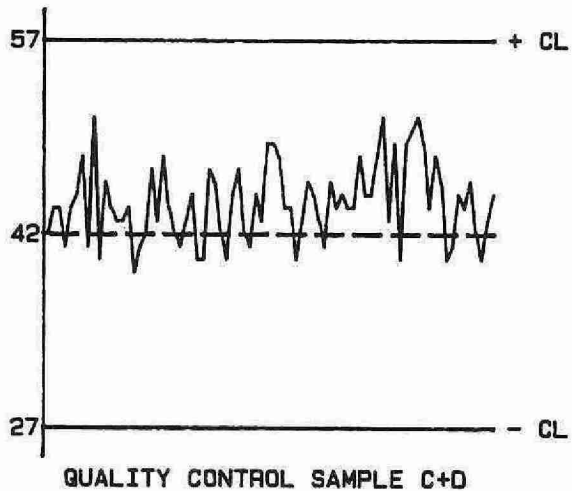
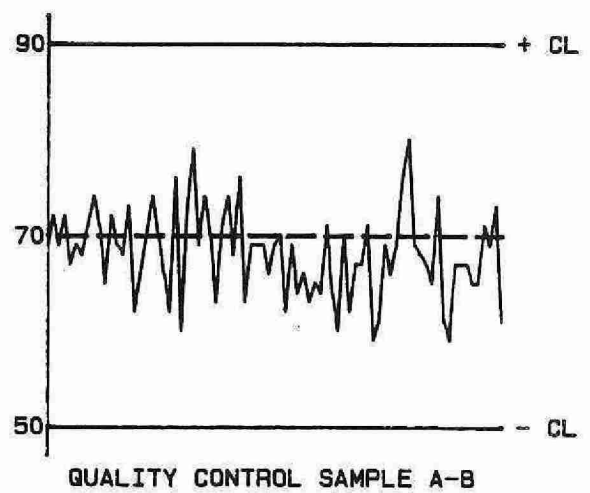
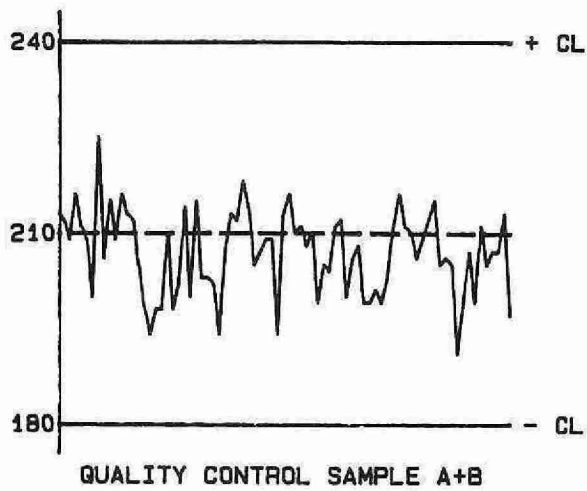
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
28	0 - 5	0.9	36.2
16	5 - 10	1.2	15.9
26	10 - 25	1.9	11.5
51	25 - 100	4.0	6.9
18	100 - 200	4.8	3.5
139	Overall	3.1	N/A

OTHER CHECKS:

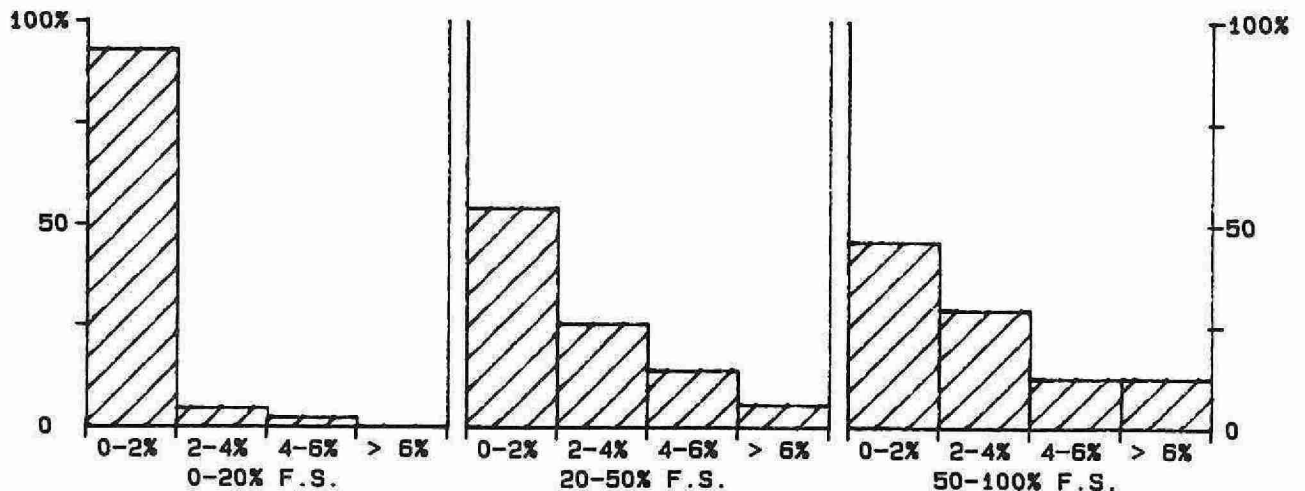
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	0	N/A	N/A
Long Term Blank :	22	0	0.0

QUALITY CONTROL GRAPHS TOTAL ALUMINUM (DOAAS) (UG/L AS AL)

FROM: 02/02/88
TO: 29/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-62-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 UG/L AS AL

***** CADMIUM - TOTAL *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/11/84
LIS Test Name Code	: CDUT	Units	: ug/L as Cd
Work Station Code	: DOAAS	Unit Code	: 063848
Method Code	: 005AF2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, and Precipitation		

SAMPLING:

Quantity Required : 1 mL
Container : 500 ml acid washed Teflon container, bagged in a clean room

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 228.8 nm.
Approximate absorbance: .400 at the full scale level

INSTRUMENTATION:

Automated GFAAS/sampler system with microcomputer data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 4 standards daily

CONTROLS:

Calibration : LTBL plus 4 standards, e.g. QCA

TOTAL CADMIUM (DOAS)
QUALITY CONTROL DATA FROM 16/02/88 TO 30/12/88

Lab: Dorset

Analytical Range: - to 2.000 ug/l as Cd

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	23	1.600	1.575	-0.025	0.1772
b :	24	0.600	0.509	-0.091	0.1110
a+b :	23	2.200	2.089	-0.111	0.2499
a-b :	23	1.000	1.061	0.061	0.1580
c :	24	0.160	0.187	0.027	0.0439
d :	24	0.060	0.058	-0.002	0.0188
c+d :	24	0.220	0.245	0.025	0.0533
c-d :	24	0.100	0.129	0.029	0.0415

s.d.(AB): Sw(within run): 0.1117 S(between runs): 0.1479 S/Sw: 1.32
s.d.(CD): Sw(within run): 0.0293 S(between runs): 0.0338 S/Sw: 1.15

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.600 to 2.800 for A+B
0.600 to 1.400 for A-B
-0.001 to 0.441 for C+D
-0.048 to 0.247 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	21	0.000 - 0.250	0.0156	12.7
	12	0.250 - 0.500	0.0197	4.9
	7	0.500 - 1.000	0.0402	5.2
	0	1.000 - 1.500	N/A	N/A
	2	1.500 - 2.000	0.0497	2.8
	42	Overall	0.0249	N/A

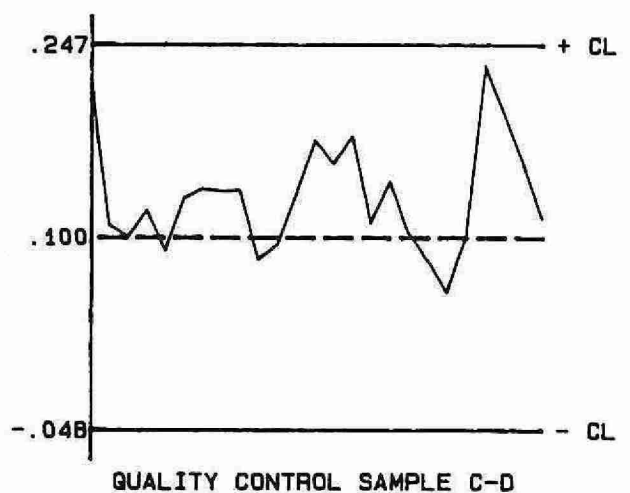
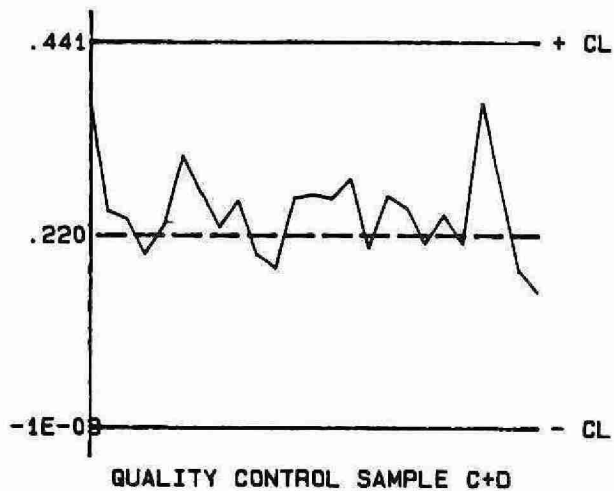
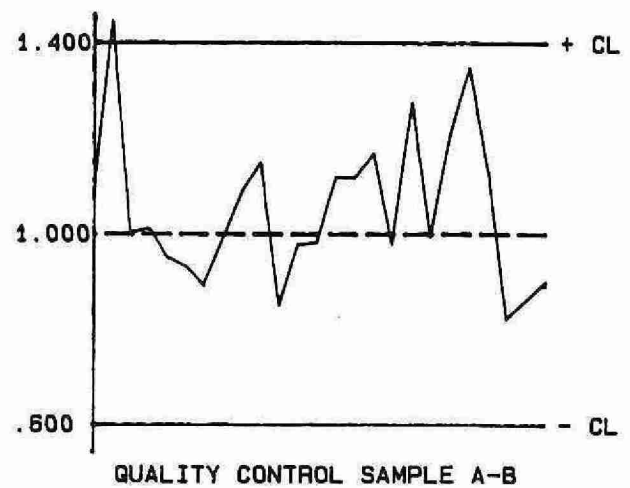
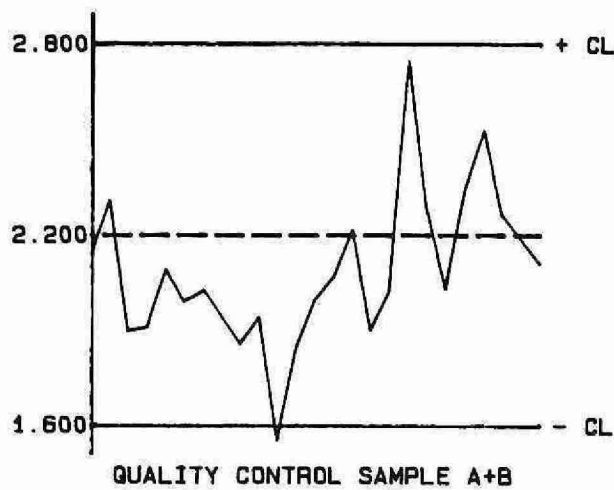
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	0	N/A	N/A
Long Term Blank :	24	0.001	0.0034

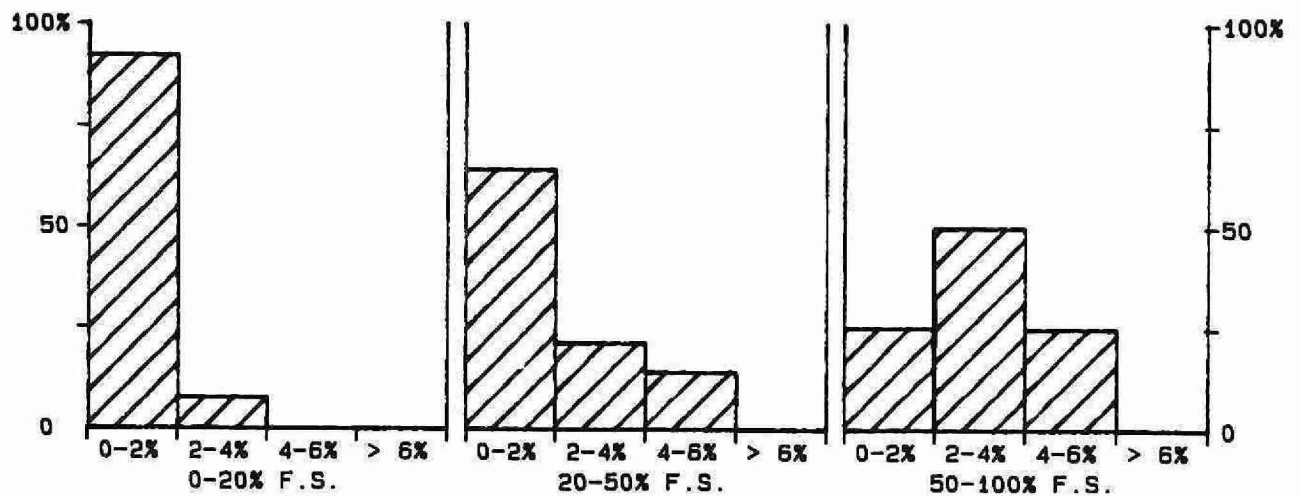
QUALITY CONTROL GRAPHS TOTAL CADMIUM (DOAAS) (UG/L AS CD)

FROM: 16/02/88

TO: 30/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-65-

CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 UG/L AS CD

***** CALCIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: PRAA	Unit Code	: 064820
Method Code:	: 002CA1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Precipitation, Throughfall, Filter extracts		

SAMPLING:

Quantity Required	: 5 mL
Container	: Polystyrene

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.2 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.02	T value: 0.1
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: 2 standards, e.g., QCA
Drift	: BL every 10 samples; 2 standards every 20 samples.

MODIFICATIONS:

17/05/85 -Three additional calibration standards were set up. Flow injection introduction of samples was adopted. System was further automated with the addition of Commodore PET microcomputer for data capture and data reduction. Sample required reduced to 5 mL.

CALCIUM - PRAA
QUALITY CONTROL DATA FROM 12/01/88 TO 29/12/88

Lab: Atomic Absorption

Analytical Range: ~ to 2.00 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	72	1.20	1.22	0.02	0.018
b :	72	0.20	0.22	0.02	0.017
a+b :	72	1.40	1.44	0.04	0.027
a-b :	72	1.00	0.98	-0.01	0.023

s.d.(AB): Sw(within run): 0.016 S(between runs): 0.018 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.31 to 1.49 for A+B
0.94 to 1.06 for A-B

DUPLICATES:

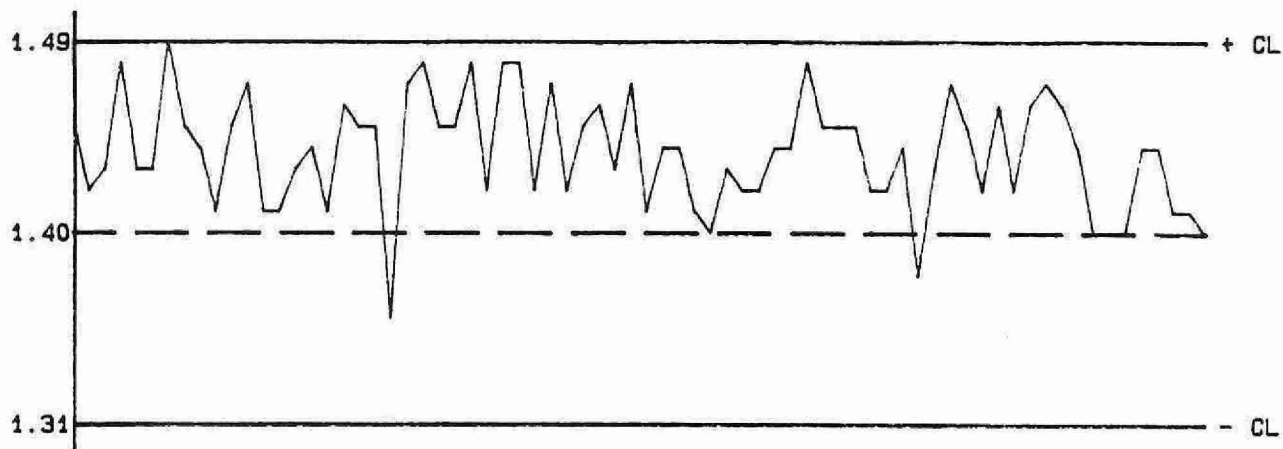
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
79	0.00 - 0.20	0.017	20.8
56	0.20 - 0.50	0.025	8.0
18	0.50 - 0.75	0.034	5.2
7	0.75 - 1.00	0.041	4.9
15	1.00 - 2.00	0.037	2.5
175	Overall	0.025	N/A

OTHER CHECKS:

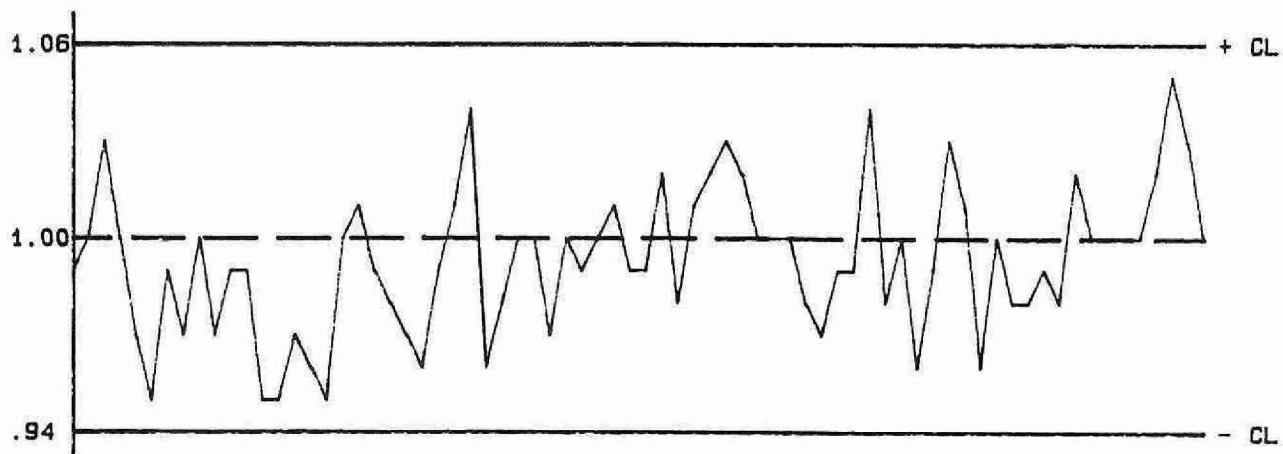
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	28	0.260	0.0126

QUALITY CONTROL GRAPHS CALCIUM - PRAA (MG/L AS CA)

FROM: 12/01/88
TO: 29/12/88

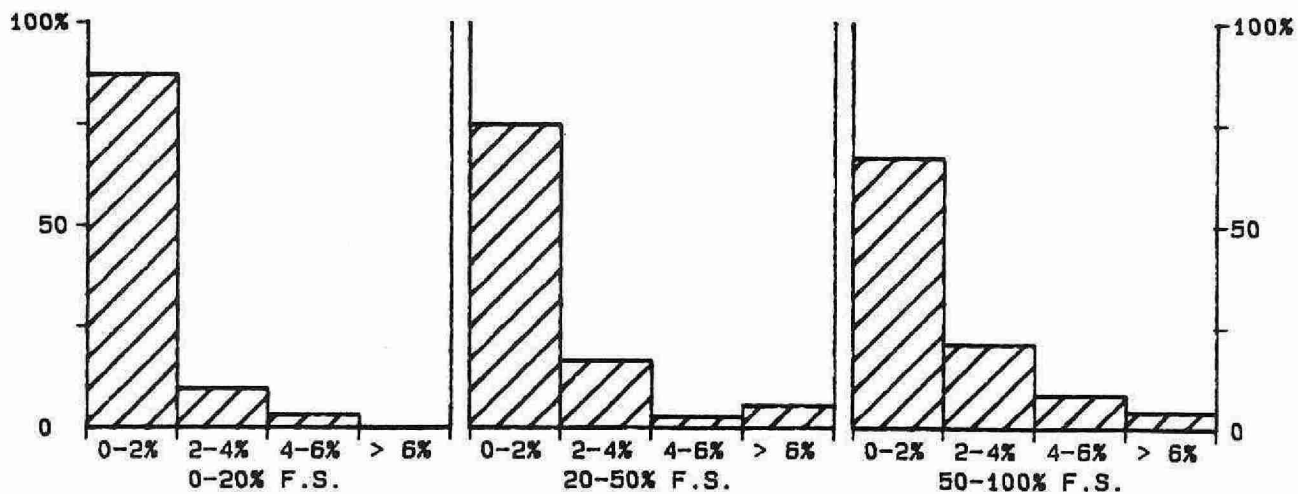


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 MG/L AS CA

***** CALCIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: PRAAS	Unit Code	: 064820
Method Code:	: 002CA1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 5 mL
Container	: Pet 500 ml Jars only

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.2 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: 2 standards, e.g., QCA
Drift	: BL every 10 samples; 2 standards every 20 samples.

MODIFICATIONS:

17/05/85 -Three additional calibration standards were set up. Flow injection introduction of samples was adopted. System was further automated with the addition of Commodore PET microcomputer for data capture and data reduction. Sample required reduced to 5 mL.

CALCIUM-PRAAS
QUALITY CONTROL DATA FROM 20/07/88 TO 30/12/88

Lab: Atomic Absorption

Analytical Range: - to 8.000 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	29	5.40	5.39	-0.01	0.033
b :	29	1.60	1.62	0.02	0.028
a+b :	29	8.00	8.01	0.01	0.044
a-b :	29	4.80	4.78	-0.02	0.043
c :	29	1.60	1.62	0.02	0.028
d :	29	0.40	0.41	0.01	0.019
c+d :	29	2.00	2.03	0.03	0.032
c-d :	29	1.20	1.21	0.01	0.036

s.d.(AB): Sw(within run): 0.030 S(between runs): 0.031 S/Sw: 1.01
s.d.(CD): Sw(within run): 0.025 S(between runs): 0.024 S/Sw: 0.94

On any given day the calibration is accepted if the values obtained lie within the ranges:

7.77 to 8.23 for A+B
4.65 to 4.95 for A-B
1.77 to 2.23 for C+D
1.05 to 1.35 for C-D

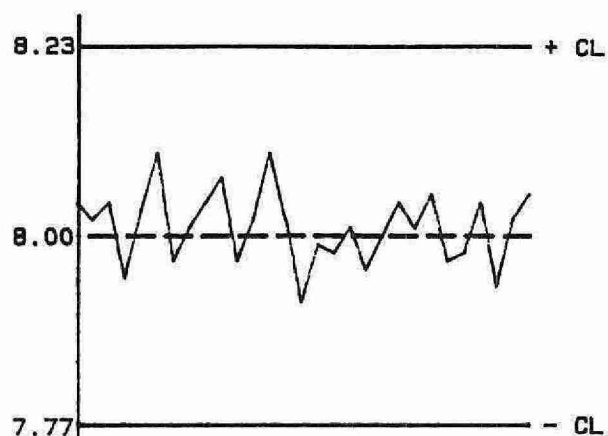
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	0	0.000 - 0.800	N/A	N/A
	6	0.800 - 2.000	0.0614	3.7
	40	2.000 - 4.000	0.0463	1.6
	23	4.000 - 6.000	0.0580	1.2
	5	6.000 - 8.000	0.0633	0.9
	74	Overall	0.0527	N/A

OTHER CHECKS:

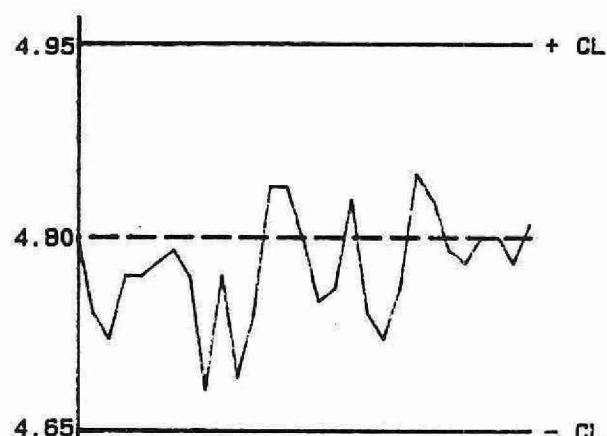
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	25	0.451	0.0926
Long Term Blank :	29	0.01	0.012

QUALITY CONTROL GRAPHS CALCIUM-PRAAS (MG/L AS CA)

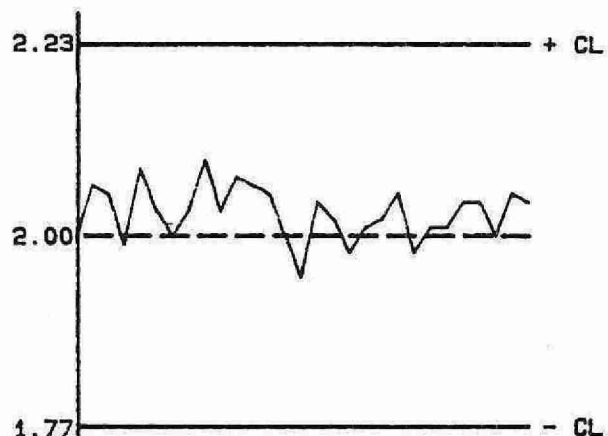
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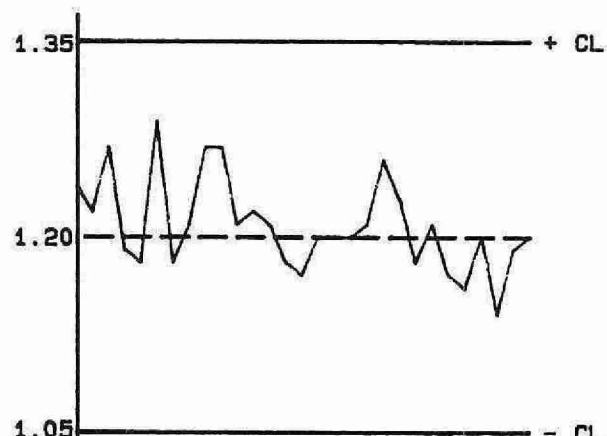
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

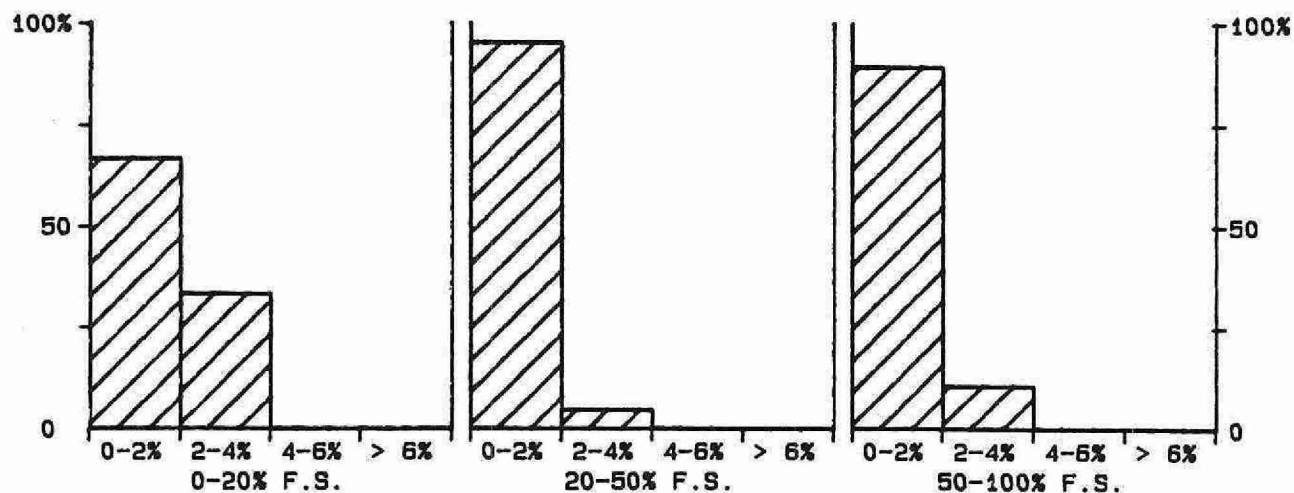


QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-71-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 8 MG/L AS CA

***** CALCIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: RMAAS	Unit Code	: 064820
Method Code	: 0901A1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts		

SAMPLING:

Quantity Required : 6 mL
Container : Glass or Pet 500 ml Jars

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.14 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : LTBL plus 3 standards, and LTB e.g., QCA
Drift : BL every 10 samples; 2 standards every 20 samples.

MODIFICATIONS;

01/12/81 -Calibration range became 20.0 mg/L full scale; second analytical range was dropped.
01/03/84 -Analytical range (RMCAMGH) was added; full scale: 5.00 mg/L. This range is currently restricted to special programs.
01/09/84 -Analytical range (RMCAMGH) was increased from 20.0 to 50.0 mg/L full scale. Calibration technique was changed from quadratic to linear interpolation. Magnesium is no longer determined simultaneously.
25/09/85 -Calibration range became 35.0 mg/L full scale; second analytical range was dropped. Commodore PET microcomputer controlled system with sample flow injection introduced.
1985 -Three analytical ranges were used during 1985: 5, 35, and 50 mg/L as Ca full scale.
06/09/88 -Changed full scale to 40 mg/L as Ca
Number of cal. standards changed from 10 to 11.

CALCIUM - RMAAS
QUALITY CONTROL DATA FROM 04/01/88 TO 29/12/88

Lab: Atomic Absorption

Analytical Range: - to 40.00 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	111	32.0	31.6	-0.2	0.33
b :	111	8.00	7.86	-0.04	0.112
a+b :	111	40.00	39.72	-0.28	0.387
a-b :	111	24.00	23.81	-0.19	0.313
c :	111	8.00	7.86	-0.04	0.111
d :	111	2.00	2.02	0.02	0.080
c+d :	111	10.00	9.97	-0.03	0.159
c-d :	111	6.00	5.84	-0.06	0.110

s.d.(AB): Sw(within run): 0.22 S(between runs): 0.25 S/Sw: 1.11
s.d.(CD): Sw(within run): 0.078 S(between runs): 0.097 S/Sw: 1.24

On any given day the calibration is accepted if the values obtained lie within the ranges:

38.20 to 41.80 for A+B
22.80 to 25.20 for A-B
8.20 to 11.80 for C+D
4.80 to 7.20 for C-D

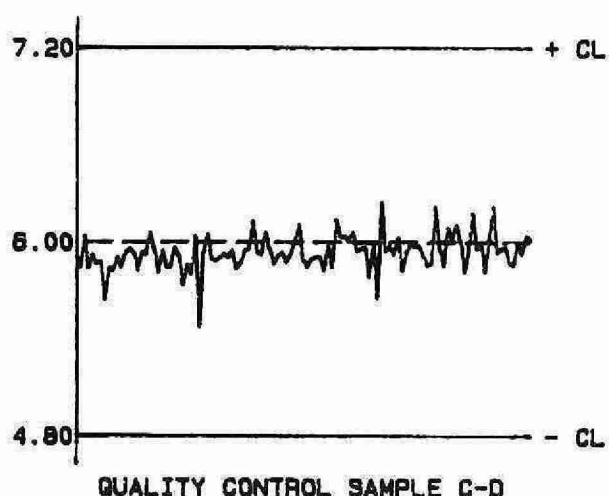
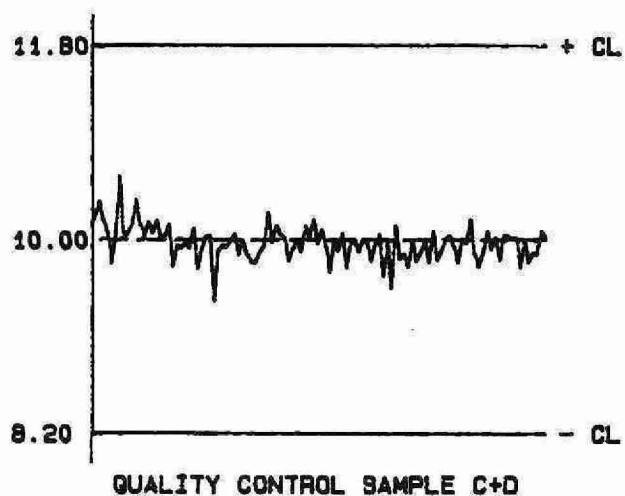
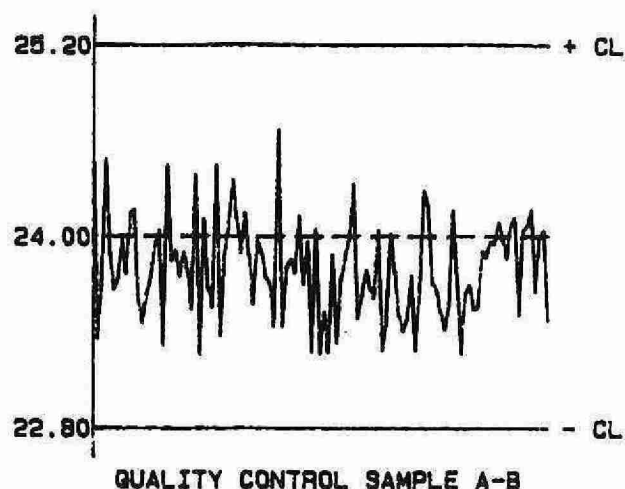
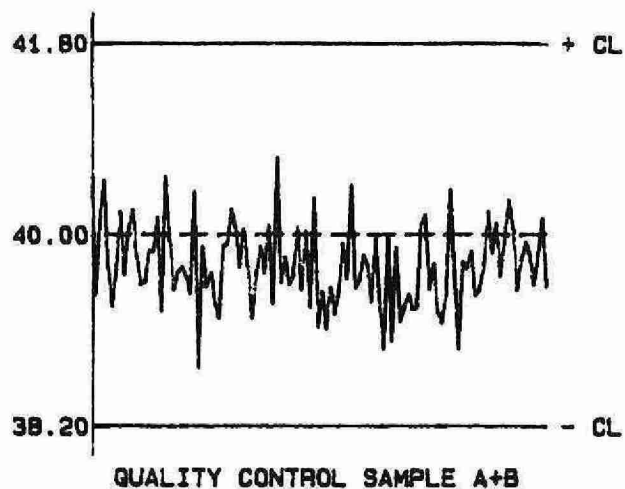
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	22	0.00 - 2.00	0.155	9.6
	94	2.00 - 5.00	0.244	7.5
	40	5.00 - 10.00	0.206	3.0
	18	10.00 - 20.00	0.220	1.3
	55	20.00 - 40.00	0.652	2.0
	229	Overall	0.374	N/A

OTHER CHECKS:

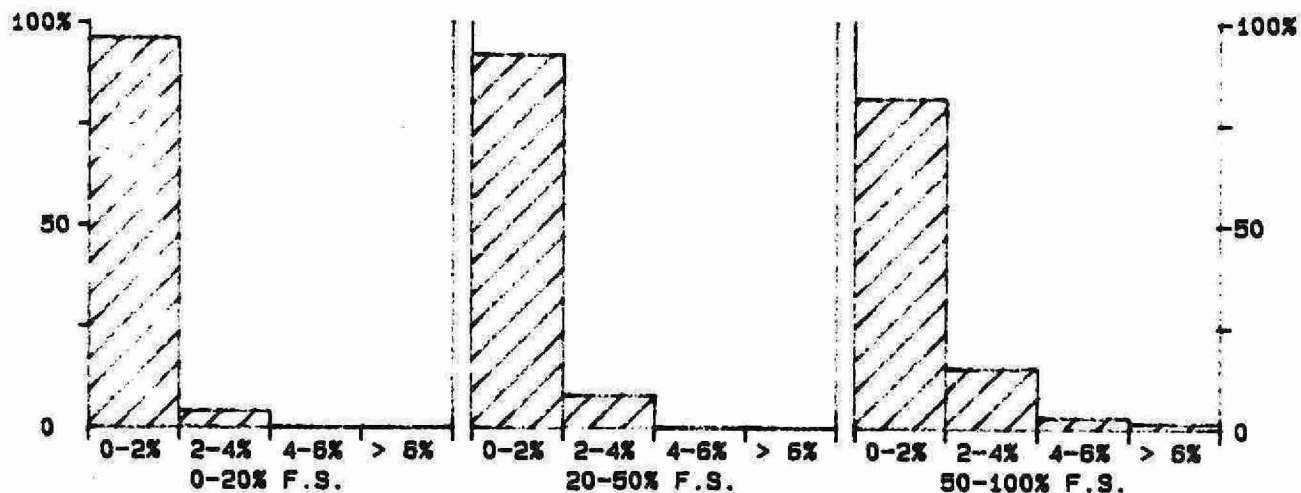
	Number of Data	Data Mean	Standard (1) Deviation
Absorbance :	105	1.139	0.0772
Long Term Blank :	110	0.01	0.037

QUALITY CONTROL GRAPHS CALCIUM - RMAAS (MG/L AS CA)

FROM: 04/01/88
TO: 29/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 40 MG/L AS CA

***** CALCIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: WAAS	Unit Code	: 064820
Method Code	: 002CA1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial Wastes		

SAMPLING:

Quantity Required : 6 mL
Container : Glass or Pet 500 ml Jars

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm using an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.17 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : LTBL plus 3 standards plus LTB e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

01/07/82 -The method introduced on this date differed slightly from Method B for calcium in HAMES in that full scale for the analytical range was 50.0 mg/L; concentrations for the QC standards were also adjusted.

08/04/86 -All sample classes moved to WAAS workstation. Single analytical range changed from full scale value 200 mg/L to 175 mg/L. Number of calibration standards increased from 2 to 10. Concentration of QC solutions adjusted accordingly. Commodore PET microcomputer system control and data handling introduced with linear interpolation of calibration technique. Sample flow injection was introduced.

1985 -Three analytical ranges were used during 1985: 5,35, and 50 mg/L as Ca full scale.

03/03/87 -Changed full scale to 200 mg/L as Ca
Number of cal. standards changed from 10 to 11
Number of QC standards changed from 2 to 3 plus LTB

CALCIUM-WAAS
QUALITY CONTROL DATA FROM 03/01/88 TO 29/12/88

Lab: Atomic Absorption

Analytical Range: - to 200.0 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	131	160.0	159.7	-0.3	2.64
b :	131	40.00	40.51	0.51	1.012
a-b :	131	200.00	200.22	0.22	3.088
a-b :	131	120.00	119.20	-0.80	2.533
c :	131	40.00	40.51	0.51	1.012
d :	131	10.0	10.1	0.1	0.51
c+d :	131	50.0	50.6	0.6	1.20
c-d :	131	30.0	30.4	0.4	1.06

s.d.(AB): Sw(within run): 1.79 S(between runs): 2.00 S/Sw: 1.12
s.d.(CD): Sw(within run): 0.750 S(between runs): 0.801 S/Sw: 1.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

191.0 to 209.0 for A+B
114.0 to 126.0 for A-B
41.0 to 59.0 for C+D
24.0 to 36.0 for C-D

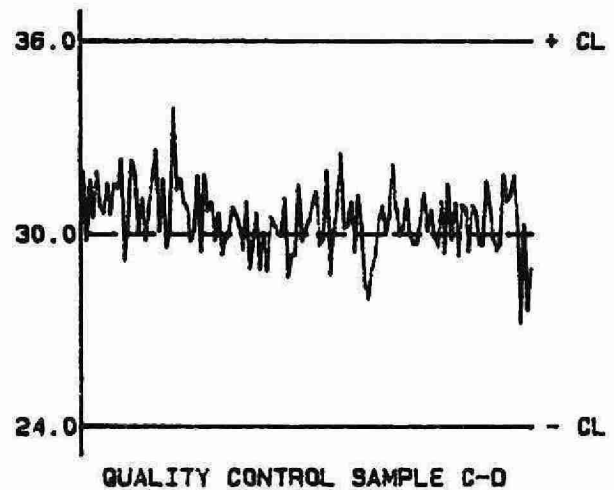
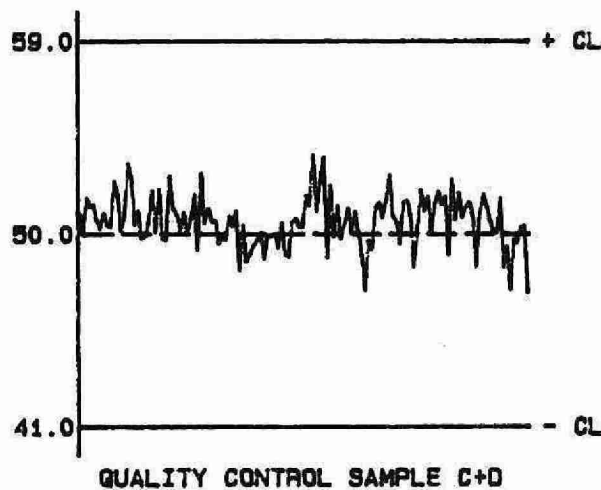
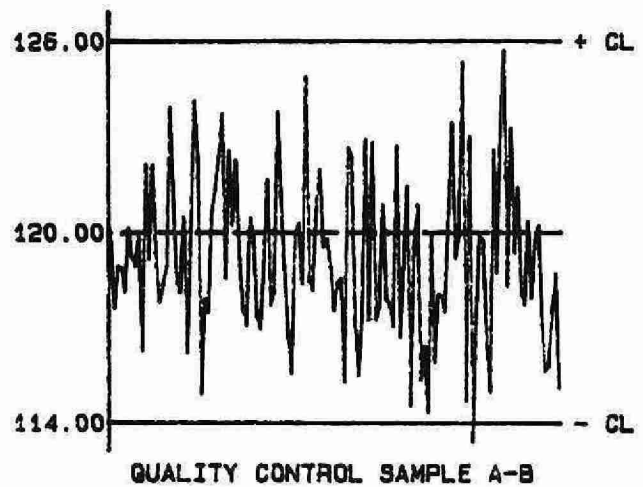
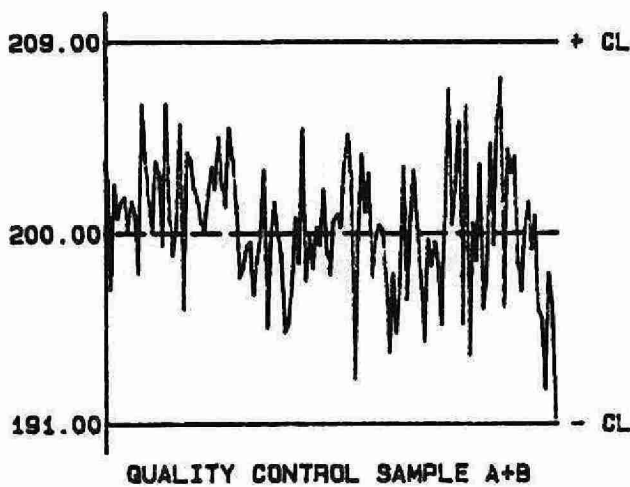
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	31	0.00 - 10.00	0.593	16.3
	22	10.00 - 20.00	0.746	4.6
	97	20.00 - 50.00	1.144	3.1
	117	50.0 - 100.0	2.01	2.6
	72	100.0 - 200.0	2.55	1.9
	339	Overall	1.79	N/A

OTHER CHECKS:

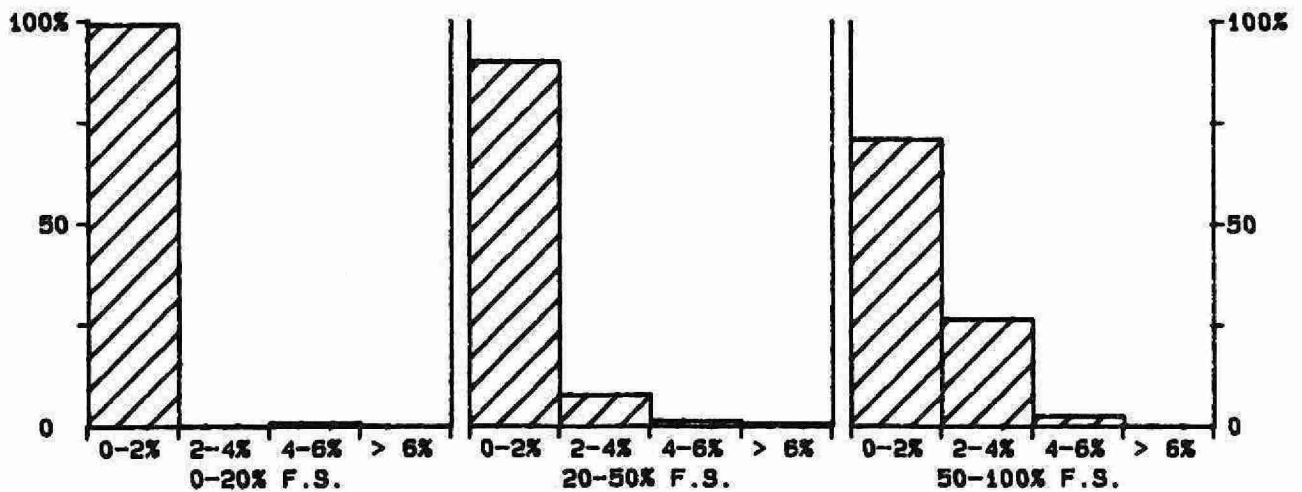
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	115	1.169	0.0710
Long Term Blank :	128	-0.05	0.216

QUALITY CONTROL GRAPHS CALCIUM-WAAS (MG/L AS CA)

FROM: 03/01/88
TO: 29/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-77-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 MG/L AS CA

*** CALCIUM - SOIL (Xsc) ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: CAESC	Units	: meq/100 g
Work Station Code	: DOCACTION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 6 g dry
Container : Glass jar

SAMPLE PREPARATION:

Samples are air dried,disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Ca by AAS at 422.7 nm with a NO₂-acetylene flames.

Approximate absorbance: 0.3 at the full scale level.

N.B. Aluminum, magnesium, and potassium are determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples (run occasionally).
Drift : BBL plus 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/04/81 -three g sample used for all soil types (6 g previously used for sandy soils)

01/06/86 -Varian AA1275 replaced Perkin Elmer 403

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.

Values for recoveries are unknown - average value used.

CALCIUM - SOIL (Xsc)
QUALITY CONTROL DATA FROM 06/01/88 TO 16/11/88

Lab: Dorset Soils

Analytical Range: - to 5.00 meq/100g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	29	3.75	3.75	0.00	0.070
b :	29	1.25	1.23	-0.02	0.060
a+b :	29	5.00	4.98	-0.02	0.093
a-b :	29	2.50	2.52	0.02	0.092

s.d.(AB): Sw(within run): 0.065 S(between runs): 0.065 S/Sw: 1.00

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.63 to 5.37 for A+B
 2.25 to 2.75 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	16	0.22	0.19	0.043
r2 :	27	17.35	16.87	0.871
r3 :	29	2.65	2.71	0.190

DUPLICATES:

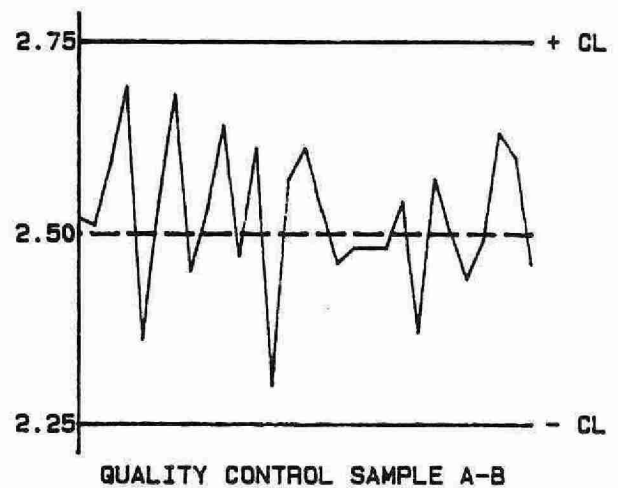
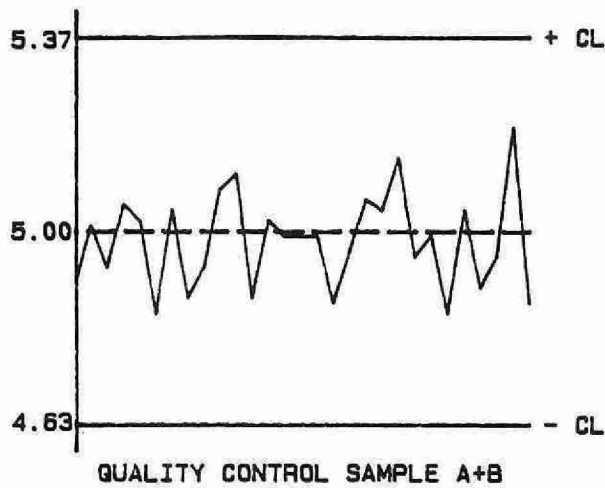
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
47	0.00 - 1.00	0.058	15.2
20	1.00 - 2.50	0.157	9.4
19	2.50 - 5.00	0.189	5.3
86	Overall	0.124	N/A

OTHER CHECKS:

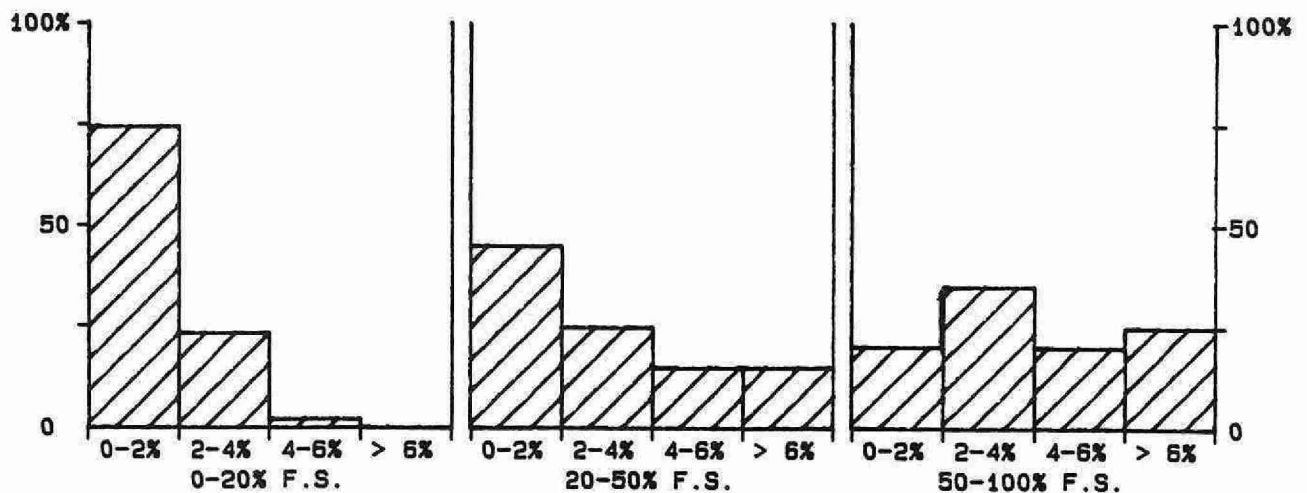
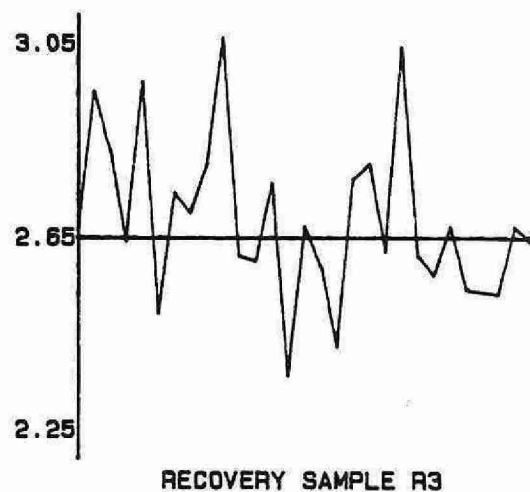
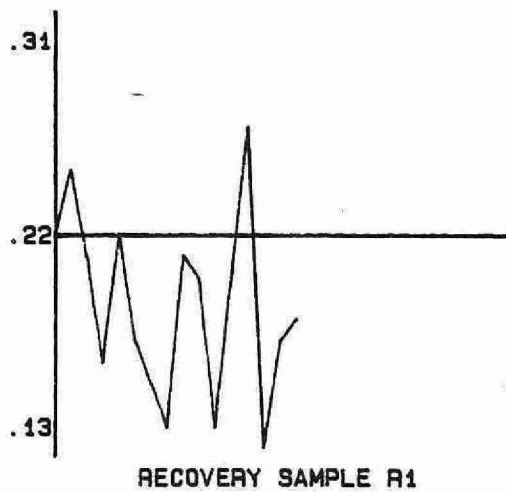
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	29	0.00	0.009

QUALITY CONTROL GRAPHS CALCIUM - SOIL (XSC) (MEQ/100G)

FROM: 06/01/88
TO: 16/11/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-80-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 5 MEQ/100G

***** CARBON - DISSOLVED INORGANIC *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
Lis Test Name Code	: DIC	Units	: mg/L as C
Work Station Code	: ROM	Unit Code	: 064806
Method Code	: 102AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Dissolved inorganic carbon, which is determined colourimetrically on the supernatant of a settled sample, is converted to carbon dioxide gas by acidification. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved inorganic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level.

N.B. Dissolved organic carbon, and reactive silicates are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: air (CO₂-free) supply, dialysis unit. Colourimetric measurement is through a 5.0 cm. light path at 550 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

MODIFICATIONS:

04/03/86 -Test transferred from ROC to ROM workstation. HP9920 microcomputer system introduced. Calibration technique changed from linear interpolation to quadratic. Number of calibration standards changed from 1 to 7.

DISSOLVED INORGANIC CARBON -ROM
QUALITY CONTROL DATA FROM 04/01/88 TO 22/12/88

Lab: Colourimetry

Analytical Range: - to 40.0 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	181	32.0	32.0	-0.0	0.60
b :	181	8.0	8.0	0.0	0.30
a+b :	181	40.0	40.0	0.0	0.31
a-b :	181	24.0	24.0	0.0	0.49
c :	181	8.0	8.0	0.0	0.30
d :	181	2.0	2.0	0.0	0.21
c+d :	181	10.0	10.0	-0.0	0.46
c-d :	181	6.0	5.9	-0.1	0.23

s.d.(AB): Sw(within run): 0.35 S(between runs): 0.47 S/Sw: 1.37
s.d.(CD): Sw(within run): 0.16 S(between runs): 0.26 S/Sw: 1.59

On any given day the calibration is accepted if the values obtained lie within the ranges:

37.8 to 42.2 for A+B
22.5 to 25.5 for A-B
9.0 to 11.0 for C+D
5.3 to 6.7 for C-D

DUPLICATES:

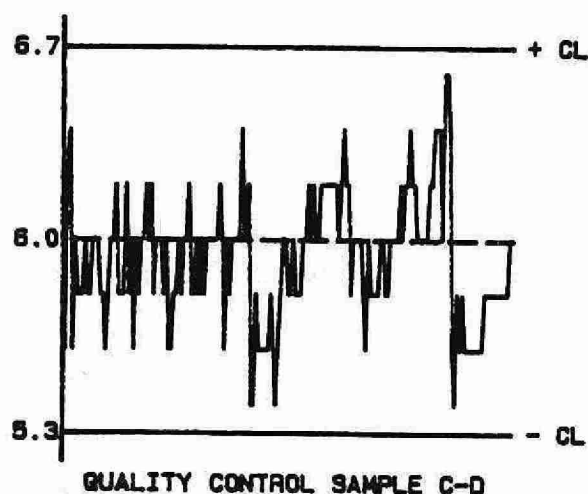
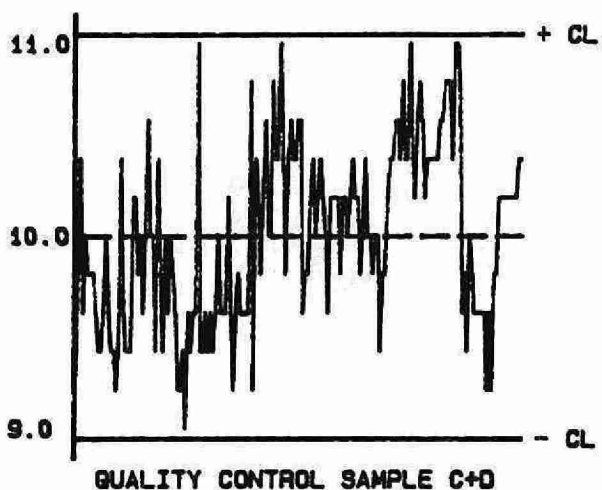
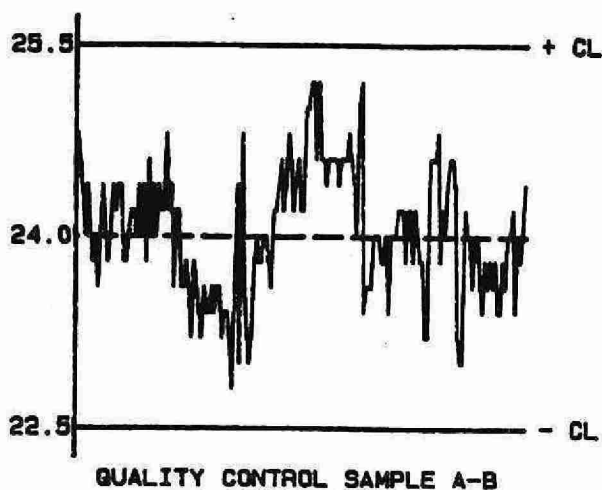
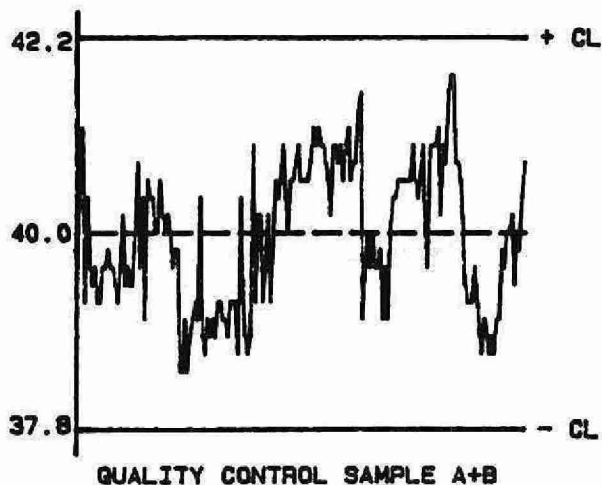
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
236	0.0 - 4.0	0.27	26.4
10	4.0 - 8.0	0.66	12.6
65	8.0 - 20.0	0.38	2.6
113	20.0 - 40.0	0.38	1.3
424	Overall	0.33	N/A

OTHER CHECKS:

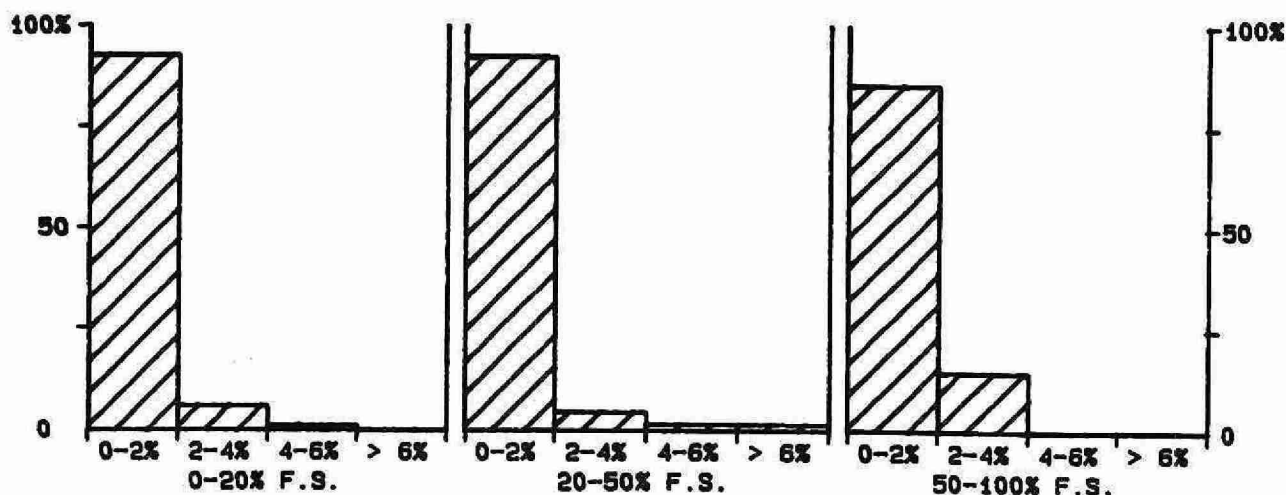
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	164	-0.0	0.13

QUALITY CONTROL GRAPHS DISSOLVED INORGANIC CARBON -ROM (MG/L AS C)

FROM: 04/01/88
TO: 22/12/88



— EXPECTED VALUE
— CONTROL LIMIT (CL)



***** CARBON - DISSOLVED INORGANIC *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 03/06/80
LIS Test Name Code	: DIC	Units	: mg/L as C
Work Station Code	: DODIC	Unit Code	: 064806
Method Code	: 1127C2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, and Soil Leachates		

SAMPLING:

Quantity Required : 50 mL
Container : Pyrex culture tubes plus screw caps with cone-shape liners, completely filled with no air space.

ANALYTICAL PROCEDURE:

Dissolved inorganic carbon, which is determined colourimetrically on the supernatant of a settled sample, is converted to carbon dioxide gas by acidification. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved inorganic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: air (CO₂-free) supply, dialysis unit. Colourimetric measurement is through a 5.0 cm. light path at 550 nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 9 standards daily

CONTROLS:

Calibration : LTBL plus 4 standards, e.g. QCA, QCB, QCC, QCD
Drift : BL every 10 samples; BL plus 1 standard every 20 samples

NOTES:

As concentrations of calibration control solutions slowly change with time at these low concentrations, calibration control ranges are based on measured averages rather than expected concentrations.

CARBON - DISSOLVED INORGANIC (DODIC)
QUALITY CONTROL DATA FROM 07/01/88 TO 22/12/88

Lab: Dorset

Analytical Range: - to 10.00 mg/l. as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	119	7.50	7.39	-0.11	0.104
b :	119	2.25	2.31	0.06	0.090
a+b :	119	9.75	9.70	-0.05	0.153
a-b :	119	5.25	5.08	-0.17	0.119
c :	119	1.50	1.52	0.02	0.044
d :	119	0.50	0.51	0.01	0.030
c+d :	119	2.00	2.03	0.03	0.067
c-d :	119	1.00	1.01	0.01	0.035

s.d.(AB): SW(within run): 0.084 S(between runs): 0.097 S/SW: 1.16
s.d.(CD): SW(within run): 0.025 S(between runs): 0.038 S/SW: 1.52

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.15 to 10.35 for A+B
4.85 to 5.65 for A-B
1.70 to 2.30 for C+D
0.80 to 1.20 for C-D

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean (2) s.d.	Coefficient of var. (%)
39	0.00 - 0.50	0.027	7.1
61	0.50 - 1.00	0.029	3.7
140	1.00 - 2.00	0.049	3.4
101	2.0 - 5.0	0.08	2.7
12	5.00 - 10.00	0.109	1.6
353	Overall	0.058	N/A

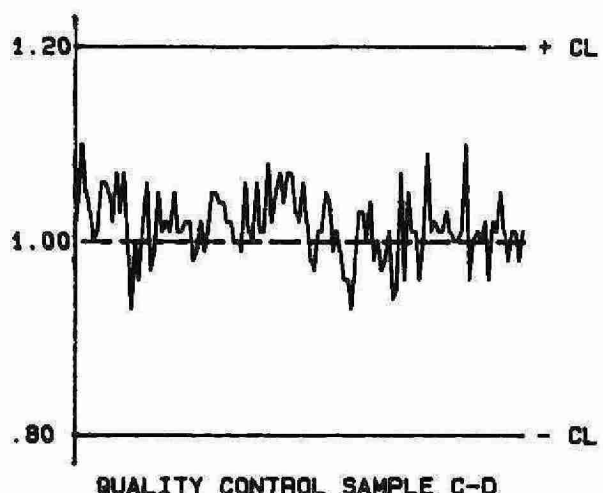
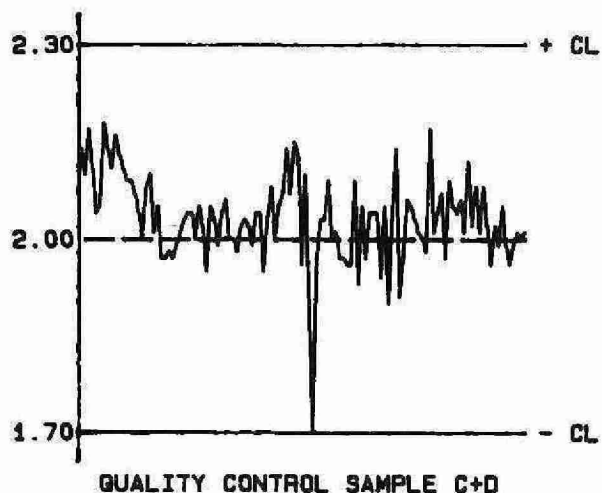
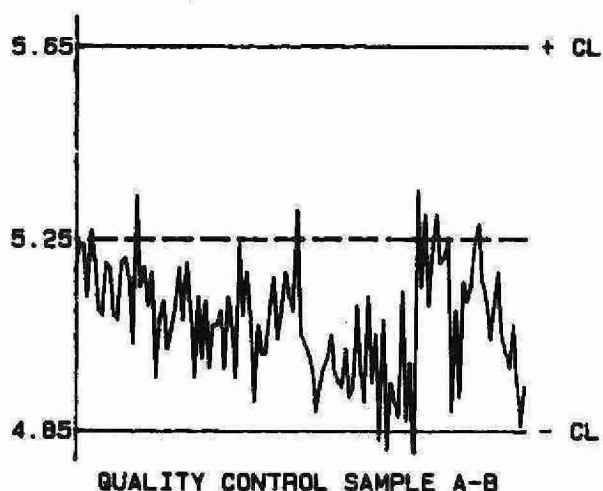
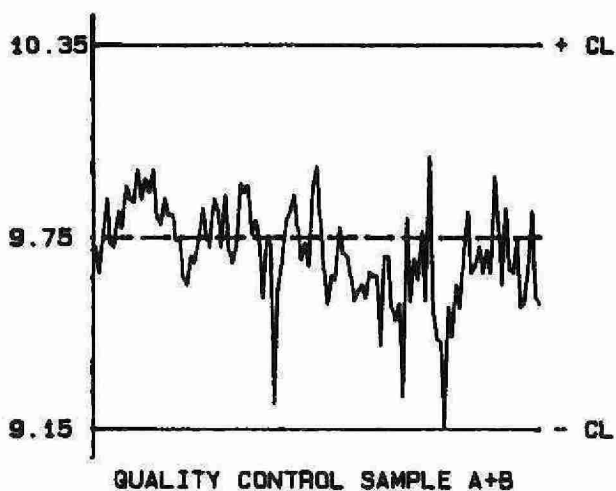
OTHER CHECKS:

	Number of Data	Data Mean	Standard (1) Deviation
STD. CAL.	119	392	12.7
Long Term Blank	119	0.17	0.033

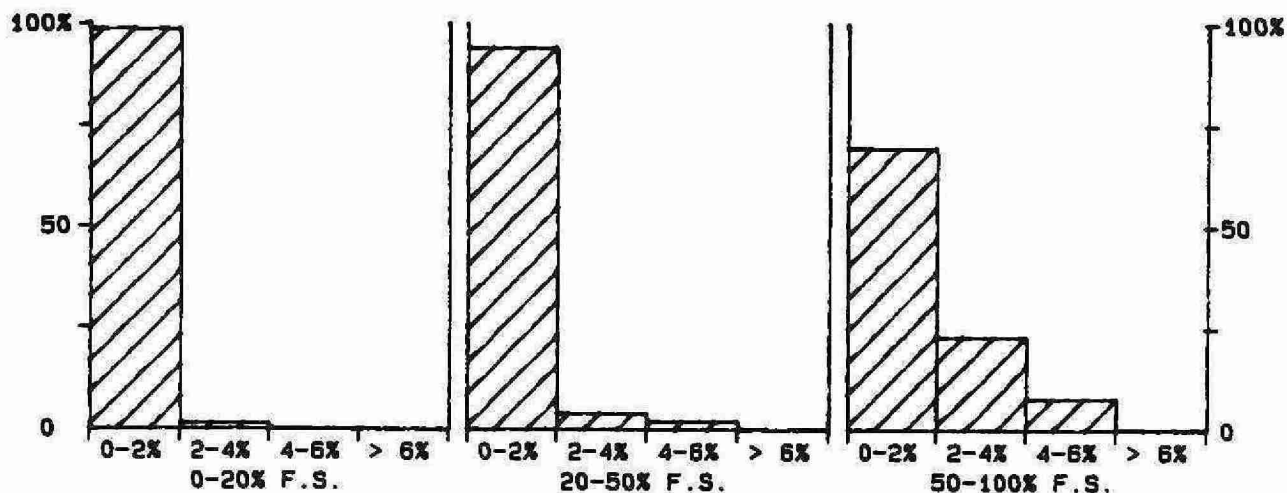
QUALITY CONTROL GRAPHS CARBON - DISSOLVED INORGANIC (DOIC) (MG/L AS C)

FROM: 07/01/88

TO: 22/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10 MG/L AS C

***** CARBON - DISSOLVED ORGANIC *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: DOC	Units	: mg/L as C
Work Station Code	: ROM	Unit Code	: 064806
Method Code	: 102AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water		
Supplies, Leachates, Sewages, Industrial Wastes			

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Using an automated system, the supernatant from a settled sample is acidified and flushed with nitrogen gas (500 mL/min) to remove inorganic carbon. Organic carbon is then oxidized to carbon dioxide gas by exposure to ultra-violet light (UV) in acid-persulphate media. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved organic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level.

N.B. Dissolved inorganic carbon, and reactive silicates are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: nitrogen and air (CO₂-free) supplies with flow controls, dialysis unit, UV digester. Colourimetric measurement is through a 5.0 cm. light path at 550 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.1	T value: 0.5
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

04/03/86 -Test transferred from ROC to ROM workstation. HP9920 microcomputer system introduced. Calibration technique changed from linear interpolation to quadratic. Number of calibration standards changed from 1 to 7.

DISSOLVED ORGANIC CARBON-ROM
QUALITY CONTROL DATA FROM 04/01/88 TO 22/12/88

Lab: Colourimetry

Analytical Range: - to 20.0 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	169	16.0	15.9	-0.1	0.21
b :	169	4.0	3.9	-0.1	0.10
a+b :	169	20.0	19.9	-0.1	0.26
a-b :	169	12.0	12.0	-0.0	0.20
c :	169	4.0	3.9	-0.1	0.10
d :	169	1.0	1.0	0.0	0.08
c+d :	169	5.0	4.9	-0.1	0.16
c-d :	169	3.0	2.9	-0.1	0.08

s.d.(AB): Sw(within run): 0.14 S(between runs): 0.16 S/Sw: 1.16
s.d.(CD): Sw(within run): 0.06 S(between runs): 0.09 S/Sw: 1.60

On any given day the calibration is accepted if the values obtained lie within the ranges:

19.3 to 20.7 for A+B
11.5 to 12.5 for A-B
4.6 to 5.4 for C+D
2.8 to 3.2 for C-D

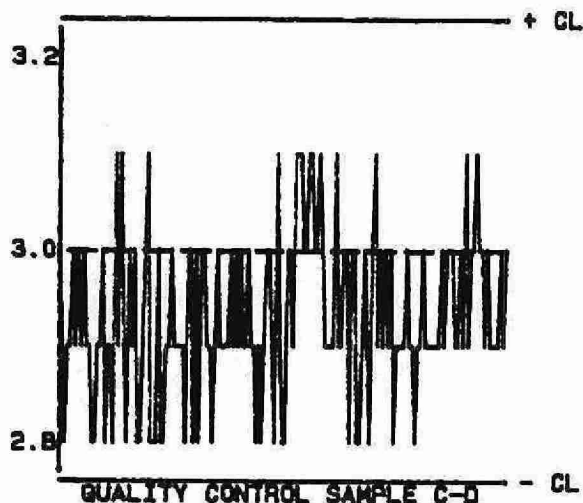
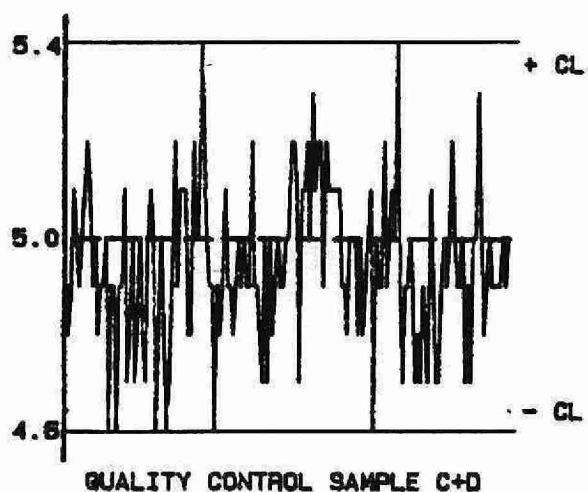
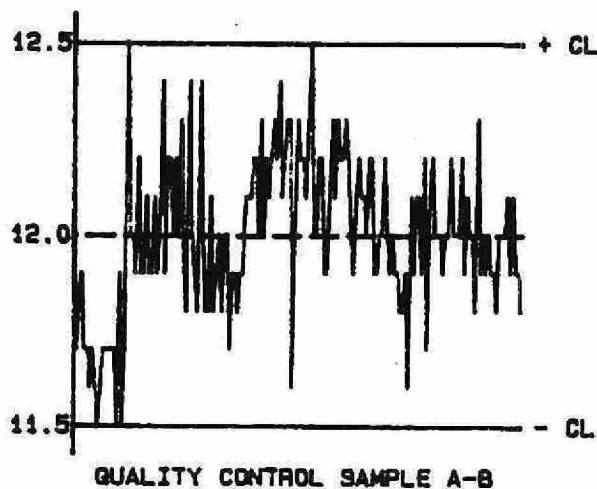
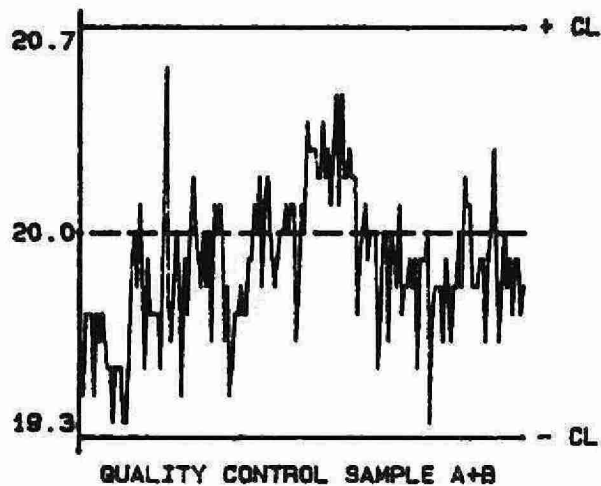
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	128	0.0 - 2.0	0.13	10.9
	141	2.0 - 4.0	0.17	5.7
	128	4.0 - 10.0	0.20	3.1
	39	10.0 - 20.0	0.26	1.9
	436	Overall	0.18	N/A

OTHER CHECKS:

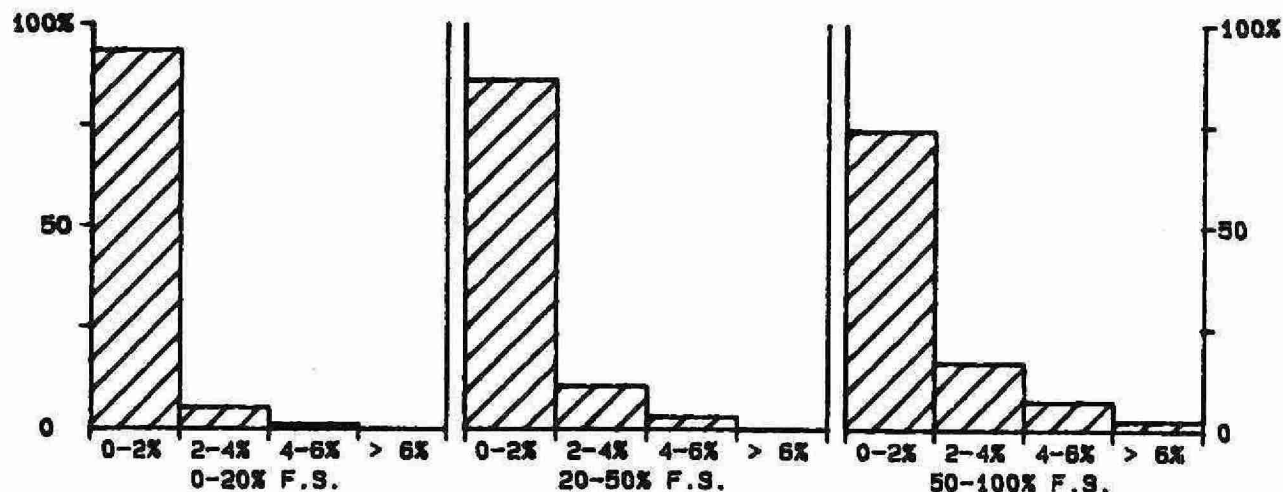
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	164	0.0	0.08

QUALITY CONTROL GRAPHS DISSOLVED ORGANIC CARBON-DM (MG/L AS C)

FROM: 04/01/88
TO: 22/12/88



— EXPECTED VALUE
— CONTROL LIMIT (CL)



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CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 20 MG/L AS C

***** ORGANIC CARBON - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/10/80
LIS Test Name Code	: ORGC	Units	: % organic carbon
Work Station Code	: DOOXMAT	Unit Code	: 500806
Method Code	: CALCO1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.1 to 0.5 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried and ground to <150 um.

ANALYTICAL PROCEDURE:

The percentage by weight of organic carbon in a soil sample is calculated as the difference between total carbon and inorganic carbon. Total carbon is determined by a Leco CR-12 or a Leco WR112. Inorganic carbon (carbonate C) is determined coulometrically after reaction of the sample in HCl.

INSTRUMENTATION:

-Leco CR-12 or Leco WR112 (for analysis of inorganic carbon see Inorganic Carbon - Soil)

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CONTROLS:

Soil control, CaCO₃, BaCO₃, Asparagine for low level; CaCO₃, Asparagine, KHP for high level.

MODIFICATIONS:

01/01/81 -Samples analyzed by the Modified Walkley-Black procedure.
01/01/82 -Samples analyzed by routine COD method in the WQS.
01/01/83 -Samples analyzed by method developed for colourimetric analysis of chromium (i.e. wet digestion-dichromate/H₂SO₄).
01/01/84 - Samples analyzed for total carbon by Leco CR-12 or Leco WR112. Organic carbon is determined by subtracting the inorganic carbon from the total carbon.

ORGANIC CARBON - SOIL
QUALITY CONTROL DATA FROM 05/07/88 TO 23/11/88

Lab: Dorset Soils

Analytical Range: - to 40.00 % total carbon

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	7	32.00	32.40	0.40	0.574
b :	7	6.00	5.72	-0.28	0.220
a+b :	7	38.00	38.12	0.12	0.674
a-b :	7	26.00	26.68	0.68	0.550
c :	7	6.00	5.72	-0.28	0.220
d :	9	12.00	12.01	0.01	0.306
c+d :	7	18.00	17.75	-0.25	0.474
c-d :	7	-6.00	-6.31	-0.31	0.316

s.d.(AB): Sw(within run): 0.389 S(between runs): 0.435 S/Sw: 1.12
s.d.(CD): Sw(within run): 0.223 S(between runs): 0.266 S/Sw: 1.19

On any given day the calibration is accepted if the values obtained lie within the ranges:

35.00 to 41.00 for A+B
24.00 to 28.00 for A-B
15.00 to 21.00 for C+D
-8.00 to -4.00 for C-D

RECOVERIES:

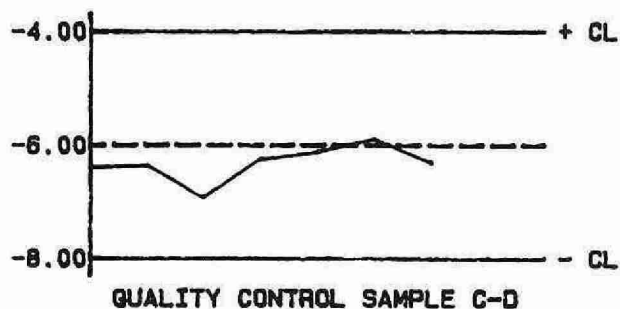
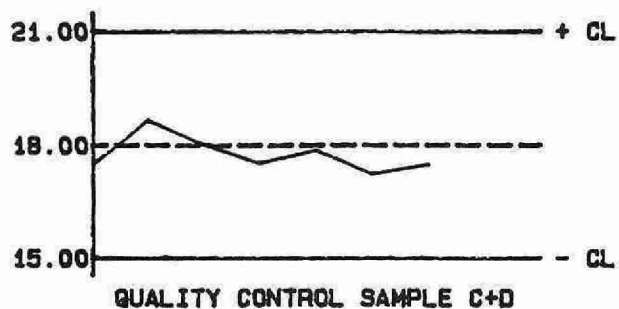
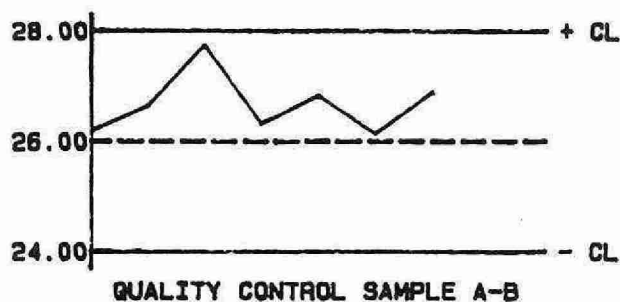
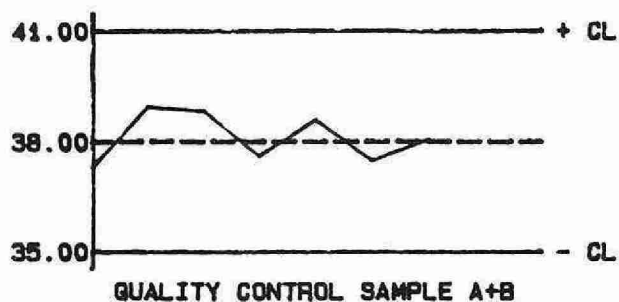
	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	9	1.40	1.42	0.060
r2 :	7	5.00	5.57	0.170

DUPLICATES:

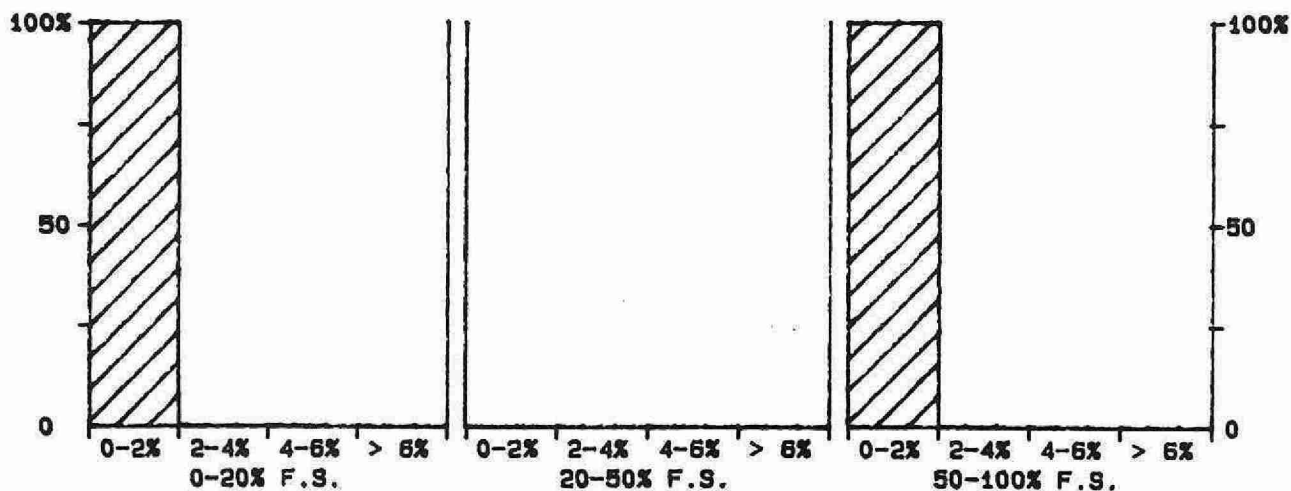
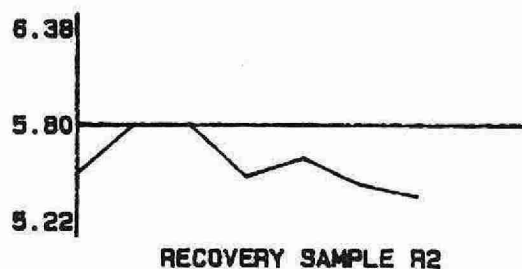
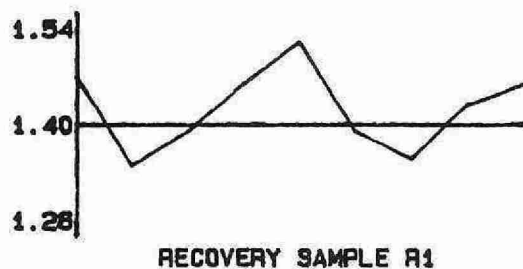
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
31	0.00 - 5.00	0.159	7.7
4	5.00 - 10.00	0.248	3.7
0	10.00 - 20.00	N/A	N/A
1	20.00 - 40.00	N/A	N/A
36	Overall	0.188	N/A

QUALITY CONTROL GRAPHS ORGANIC CARBON - SOIL (% TOTAL CARBON)

FROM: 05/07/88
TO: 23/11/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



***** CHLORIDE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/75
LIS Test Name Code	: CLIDUR	Units	: mg/L as Cl
Work Station Code	: COCL	Unit Code	: 064960
Method Code	: 004BC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers (non-APIOS) , Lakes (non-APIOS) , Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Chloride ions are combined with mercuric thiocyanate releasing thiocyanate quantitatively. Thiocyanate then reacts with ferric ions to produce ferric thiocyanate (red), and the absorbance of the latter is measured colourimetrically.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 1.5 cm. light path at 470 nm.
Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

BL plus 7 standard

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

MODIFICATIONS:

None.

NOTE:

This workstation was created Oct.22/87 to take over all chloride testing being done on the ROM wordstation, and at the separate "chloride only" sub-workstation. The original channels were retired at that time. The COCL wordstation uses the identical method with a minor range change to suit the range of values expected from the fall sample load. Chloride testing for river, and lake samples collected under the APIOS program, and for precipitation samples, is performed by ion chromatography at the PRIC1 workstation.

CHLORIDE-COCL
QUALITY CONTROL DATA FROM 05/01/88 TO 29/12/88

Lab: Colourimetry

Analytical Range: - to 100.0 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	140	75.0	75.4	0.4	0.24
b :	140	25.0	25.2	0.2	0.15
a+b :	140	100.0	100.6	0.6	0.29
a-b :	140	50.0	50.2	0.2	0.28
c :	140	25.0	25.2	0.2	0.15
d :	140	5.0	4.9	-0.1	0.14
c+d :	140	30.0	30.1	0.1	0.25
c-d :	140	20.0	20.3	0.3	0.16

s.d.(AB): Sw(within run): 0.20 S(between runs): 0.20 S/Sw: 1.01
s.d.(CD): Sw(within run): 0.11 S(between runs): 0.15 S/Sw: 1.28

On any given day the calibration is accepted if the values obtained lie within the ranges:

38.8 to 101.2 for A+B
49.2 to 50.8 for A-B
29.3 to 30.7 for C+D
19.6 to 20.4 for C-D

DUPLICATES:

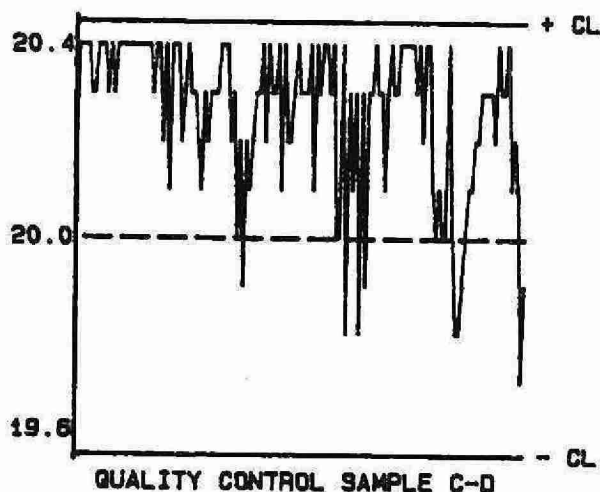
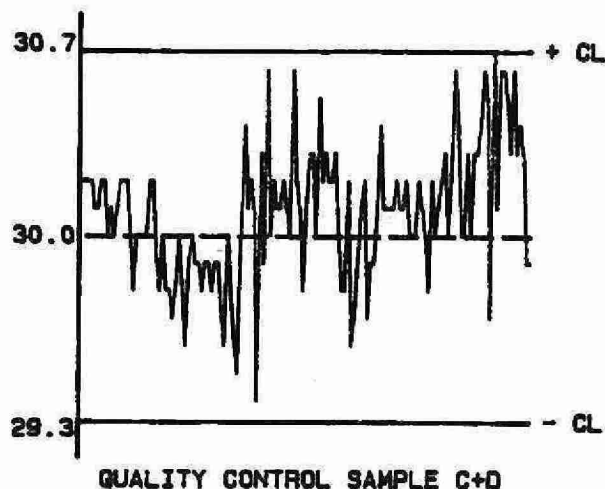
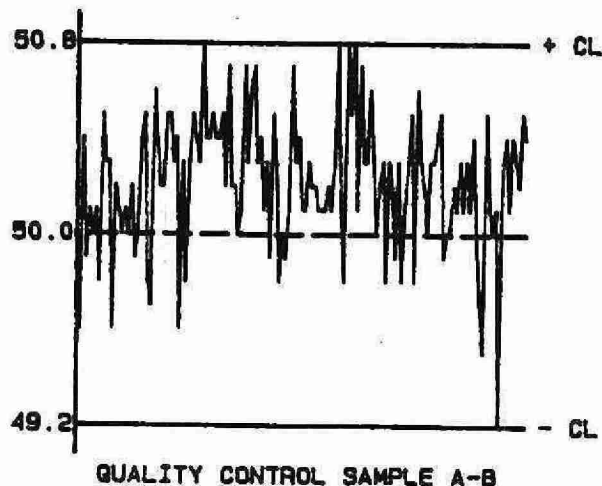
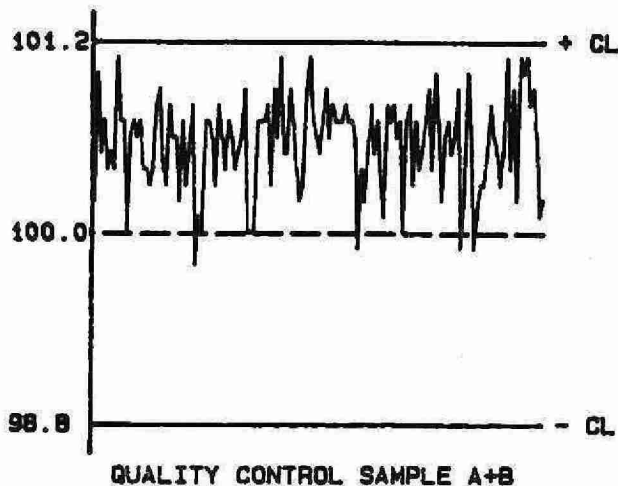
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
143	0.0 - 10.0	0.12	2.3
83	10.0 - 20.0	0.39	2.5
104	20.0 - 50.0	0.41	1.3
45	50.0 - 100.0	0.64	0.8
375	Overall	0.37	N/A

OTHER CHECKS:

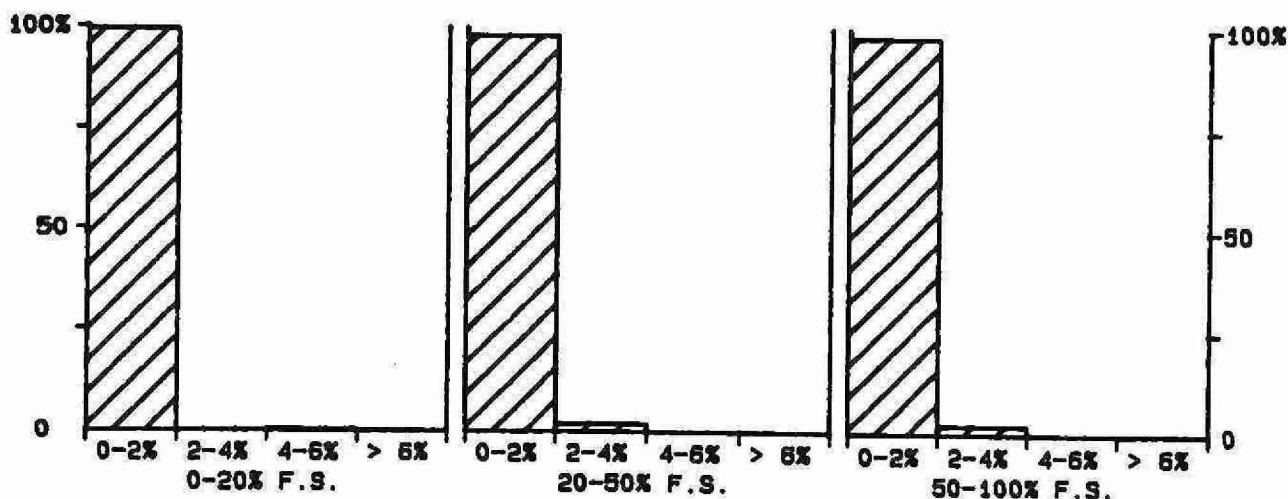
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	78	0.1	0.09

QUALITY CONTROL GRAPHS CHLORIDE-COCL (MG/L AS CL)

FROM: 05/01/88
TO: 29/12/88



— EXPECTED VALUE
— CONTROL LIMIT (CL)



-95-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 MG/L AS CL

*** CHLORIDE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: CLIDUR	Units	: mg/L as Cl
Work Station Code	: PRIC1	Unit Code	: 064960
Method Code	: 005A10	Supervisor	: F. Lo
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 15 mL
Container : Polystyrene bottle

ANALYTICAL PROCEDURE:

Chloride is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of chloride in mg/L as Cl is determined by the comparison of the sample scan to a series of standard scans. Full scale conductivity: 10 uS/cm.

N.B. Nitrogen-nitrate and sulphate are determined simultaneously.

INSTRUMENTATION:

Basic modular continuous flow ion chromatographic system plus microcomputer for automated sample introduction, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.01

T value: 0.05

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

MODIFICATIONS:

20/09/84 -Chloride range was changed from 1.50 mg/L full scale to 2.00 mg/L full scale.

12/04/85 -Chloride quality control standards were changed; QCA from 1.20 to 1.60 mg/L, QCB from 0.30 to 0.40 mg/L. First three months' data were omitted because they were not comparable with the later ones.

01/04/86 -Varian Spectrex Model 4270 was introduced to convert calibration data to a quadratic equation and calculate preliminary sample concentrations; the latter, however, still have to be manually corrected for in-run sensitivity changes.

June 1988 -Direct Computer Input introduced. Uploading of instrument signal, calculation of analyte concentrations, and transmission of analytical results to LIS now done automatically.

CHLORIDE-PRIC1
QUALITY CONTROL DATA FROM 05/01/88 TO 19/12/88

Lab: Ion Chromatography

Analytical Range: - to 2.00 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	88	1.60	1.61	0.01	0.013
b :	88	0.40	0.40	0.00	0.011
a+b :	88	2.00	2.01	0.01	0.018
a-b :	88	1.20	1.21	0.01	0.016

s.d.(AB): Sw(within run): 0.011 S(between runs): 0.012 S/Sw: 1.06

On any given day the calibration is accepted if the values obtained lie within the ranges:

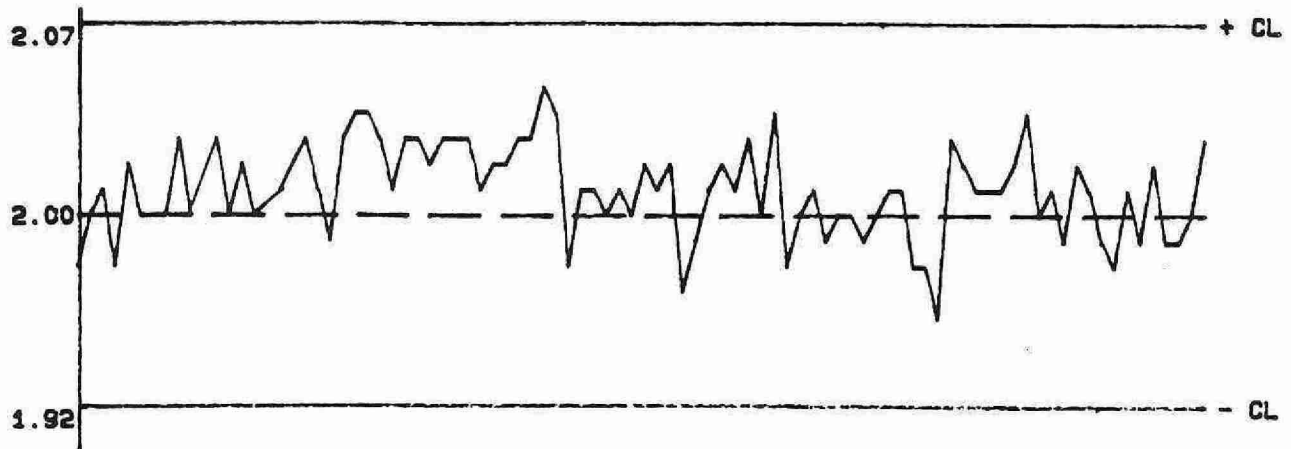
1.92 to 2.07 for A+B
 1.15 to 1.25 for A-B

DUPLICATES:

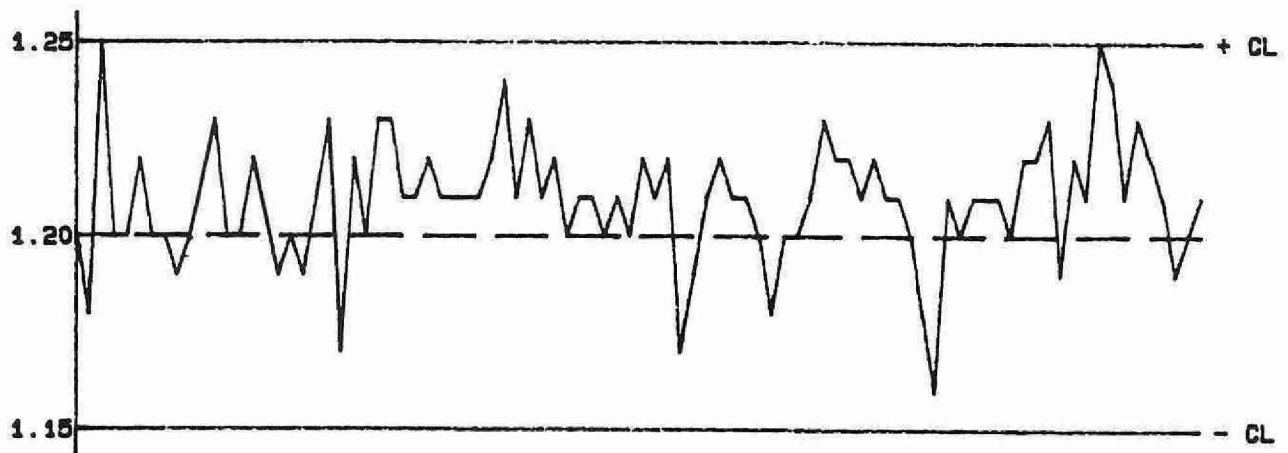
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
76	0.00 - 0.20	0.011	12.9
81	0.20 - 0.50	0.013	3.6
53	0.50 - 1.00	0.020	2.8
18	1.00 - 2.00	0.014	1.0
228	Overall	0.014	N/A

QUALITY CONTROL GRAPHS CHLORIDE-PRIC1 (MG/L AS CL)

FROM: 05/01/88
TO: 19/12/88

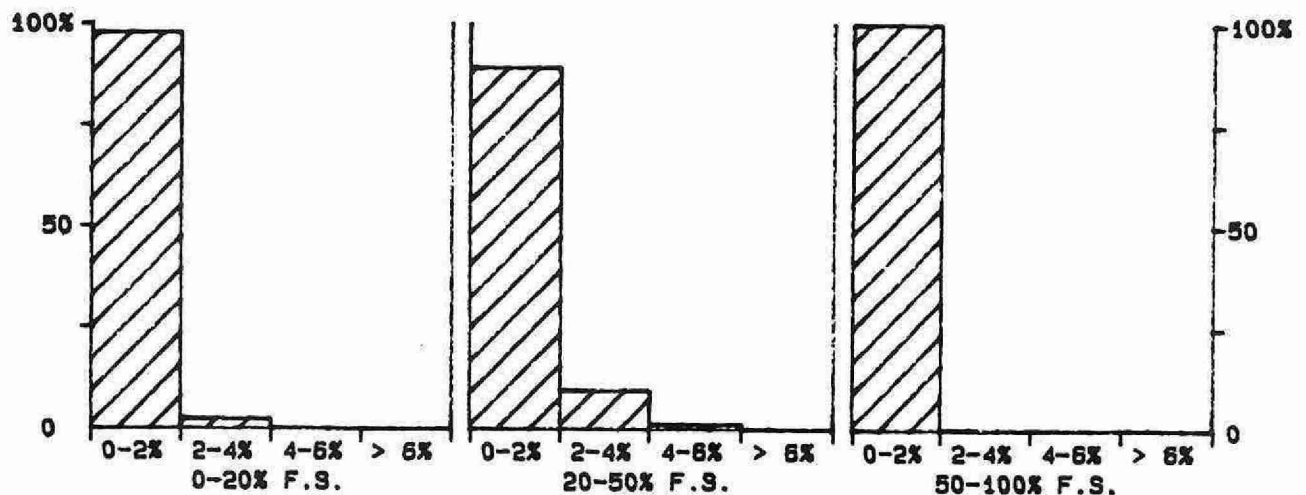


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-98-

CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 MG/L AS CL

***** CHLORIDE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: CLIDUR	Units	: ug/Filter as Cl
Work Station Code	: PRLOV	Unit Code	: 361960
Method Code	: 004AIC	Supervisor	: F. Lo
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Chloride is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of chloride in mg/L as Cl is determined by the comparison of the sample scan to a series of standard scans. Results are converted to ug/filter as Cl.
Full scale conductivity: 30 uS/cm.
N.B. Nitrogen-nitrate and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; polyethylene tubes
Automated modular continuous flow ion chromatographic system

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

MODIFICATIONS:

10/03/84 -Microcomputer for automated sampling and timing was introduced. At that time automated spiking of samples with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ was introduced.
20/09/84 -Chloride range was changed from 1.50 mg/L full scale to 2.00 mg/L full scale. Quality control standards were not changed.
12/04/85 -Chloride quality control standards were changed; QCA from 1.20 to 1.60 mg/L and QCE from 0.30 to 0.40 mg/L. First three months' data were omitted because they were not comparable with the later ones.
10/05/85 -Microcomputer used for data reduction. Three additional calibration standards were set up.
April 1986 -Varian Spectrix, model 4270, introduced to convert calculation data to quadratic

equation and calculate preliminary analyte concentration.

June 1988 -Direct Computer Input introduced. Instrument signal uploading, calculation of analyte concentrations, and transmission of analytical results to LIS now done automatically.

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

CHLORIDE - PRLOV
QUALITY CONTROL DATA FROM 06/01/88 TO 12/10/88

Lab: Ion Chromatography

Analytical Range: - to 100.0 ug/Filter as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	31	80.0	80.5	0.5	0.79
b :	31	20.0	19.9	-0.1	0.56
a+b :	31	100.0	100.5	0.5	1.01
a-b :	31	60.0	60.6	0.6	0.92

s.d.(AB): Sw(within run): 0.65 S(between runs): 0.68 S/Sw: 1.05

On any given day the calibration is accepted if the values obtained lie within the ranges:

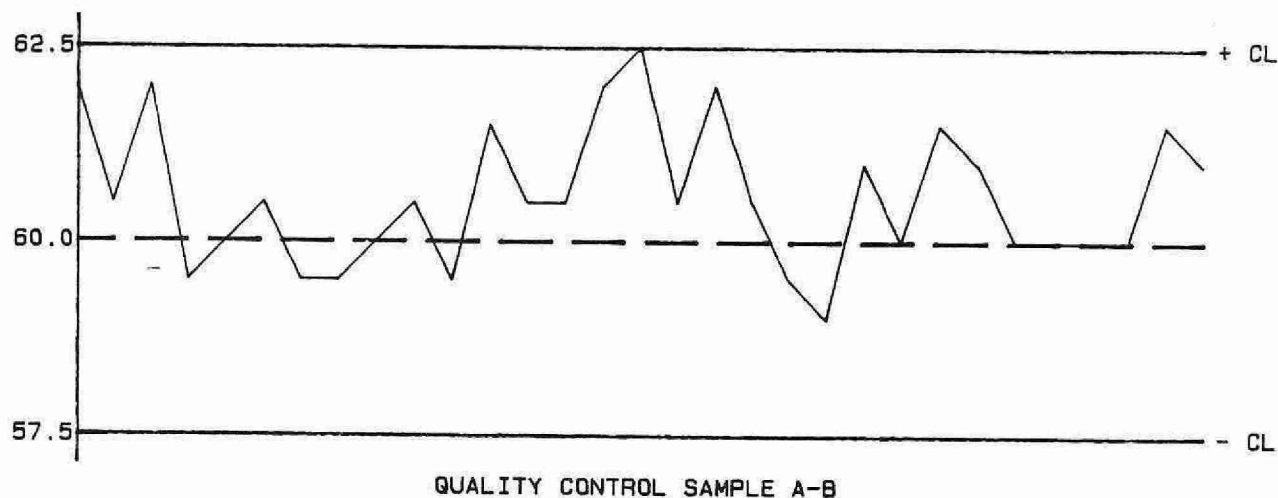
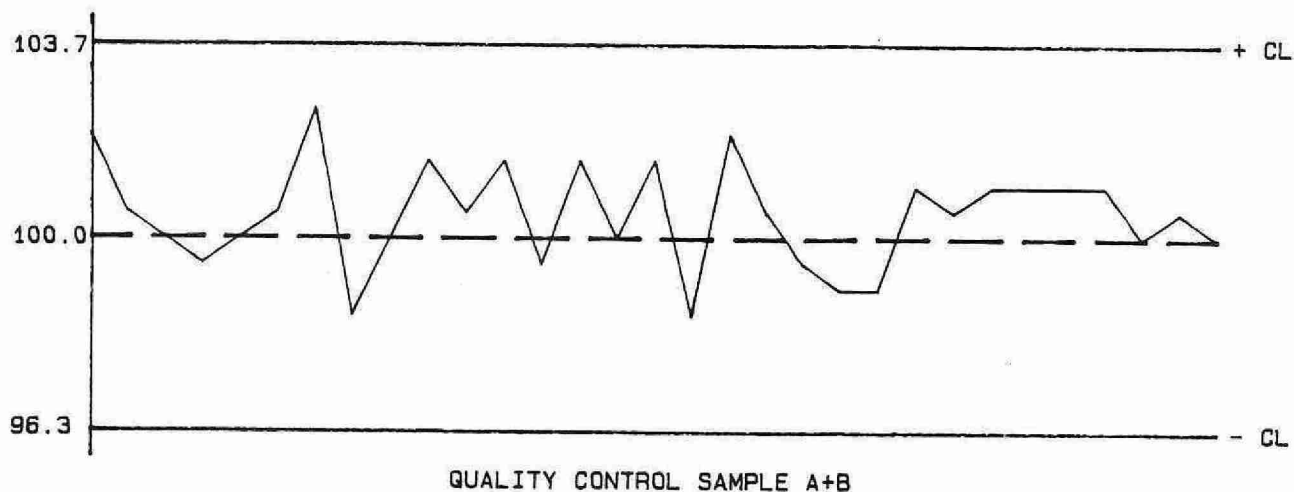
96.3 to 103.7 for A+B
 57.5 to 62.5 for A-B

DUPLICATES:

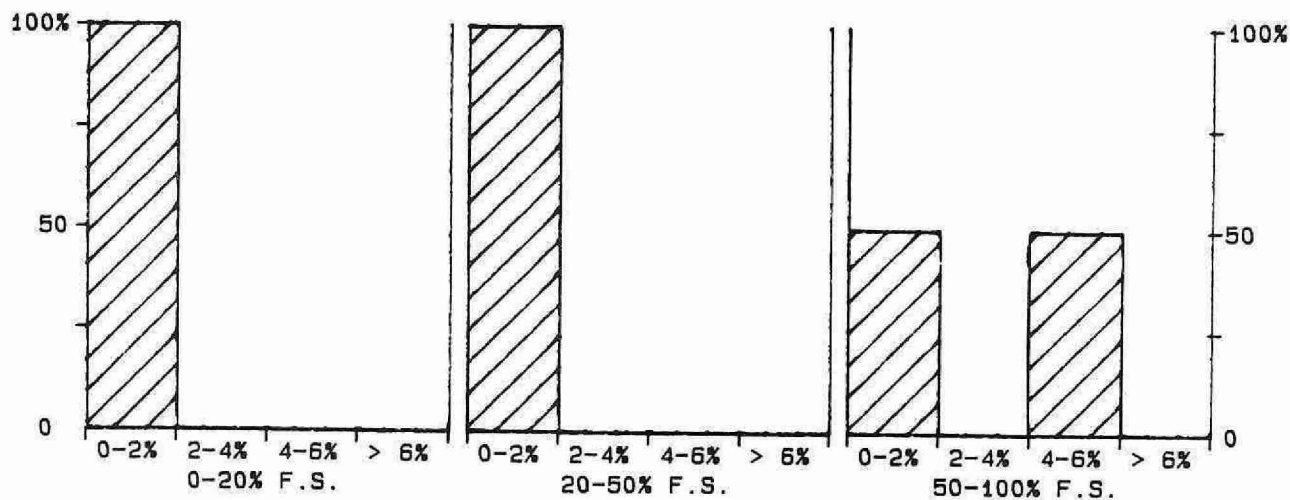
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
14	0.0 - 15.0	0.39	4.7
3	15.0 - 37.5	0.98	4.1
1	37.5 - 100.0	N/A	N/A
18	Overall	0.63	N/A

QUALITY CONTROL GRAPHS CHLORIDE - PALOV (UG/FILTER AS CL)

FROM: 06/01/88
TO: 12/10/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 UG/FILTER AS CL

***** CHLOROPHYLL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/75
LIS Test Name Code	: CHLRAT,CHLRBT,CHLRAC	Units	: ug/L
Work Station Code	: RCHLO	Unit Code	: 06300
Method Code	: 002DS2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Effluents,		

SAMPLING:

Quantity Required : 1000 mL
Container : Glass or plastic
Other : In the field a sample is filtered through a nylon filter. The filter is then placed between two membrane filter-support pads, and the package is enclosed in a plastic dish.

ANALYTICAL PROCEDURE:

Using a Commodore PET microcomputer-controlled, automated spectrophotometer, two scans are developed with absorbance measurements at 630, 645, and 663 nm for the first scans; the minimum absorbance value between 710 and 750 nm (readings at 5 nm intervals) is utilized as a turbidity correction. Chlorophyll a and b are calculated from this scan. After automated acidification, the second scan is obtained from the wavelengths 630, 645, 665 nm for calculating chlorophyll a, corrected. SCOR-UNESCO equations are used for all chlorophyll calculations.

INSTRUMENTATION:

- Automated modular continuous flow scanning spectrophotometer system
- Microcomputer system for control of sampling, timing and data processing (i.e. data capture, calculations and transfer of results to LIS)

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 ,0.1 ,1 T value: 1, 0.5, , 5

CONTROLS:

Calibration : LTBL plus 2 "standards", e.g. QCA
Drift : "standard", BL every 20 samples

MODIFICATIONS:

01/07/85 -Automated, microcomputer controlled system was introduced.
13/06/85 -Centrifuging steps were eliminated and nylon filters were introduced.
02/11/86 -Test suspended, all subsequent analysis now being done through privatization.

NOTES:

In 1982 calibration controls were stable, but were prepared from dyes rather than chlorophyll. "Standards" are now prepared from chlorophyll a and b, but the materials are neither analytical grade nor are their solutions stable. Thus calibration controls are based on measured averages.

21/11/86 -Test suspended, all subsequent analysis now being done through privatization.

***** CLAY *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: CLAY	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

To prevent flocculation a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (>53 um) is removed by wet sieving; the silt and clay fraction is dispersed in a sedimentation cylinder. The percentage of clay in the sample is based on the settling velocities of spherical particles by the application of Stokes Law.

INSTRUMENTATION:

-Sartorius 4 place digital balance (model 1201)
-Balance accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1 T value: 5

CALIBRATION:

Balance zero

CONTROLS:

Recovery : 2 long term soil samples representing different soil types plus
round robin CSSC samples (run occasionally)

NOTES:

Two recovery soils are alternated between batches, using their mean values.

CLAY
QUALITY CONTROL DATA FROM 22/01/88 TO 08/08/88

Lab: Dorset Soils

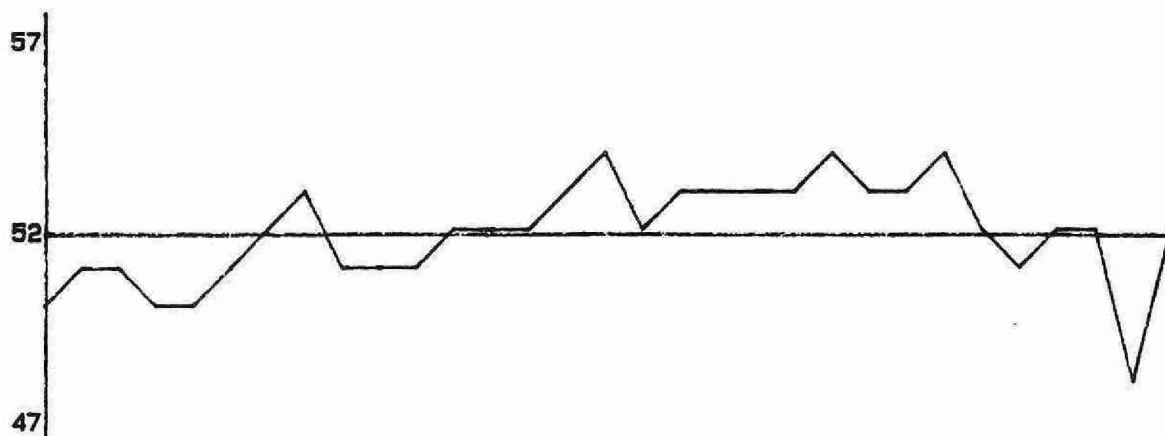
Analytical Range: - to 100 % by wt.

RECOVERIES:	Number of Data	Expected Concn	Av. Conc. Measured	Standard (1) Deviation
r1 :	31	52	52	1.4
r2 :	31	2	2	0.8

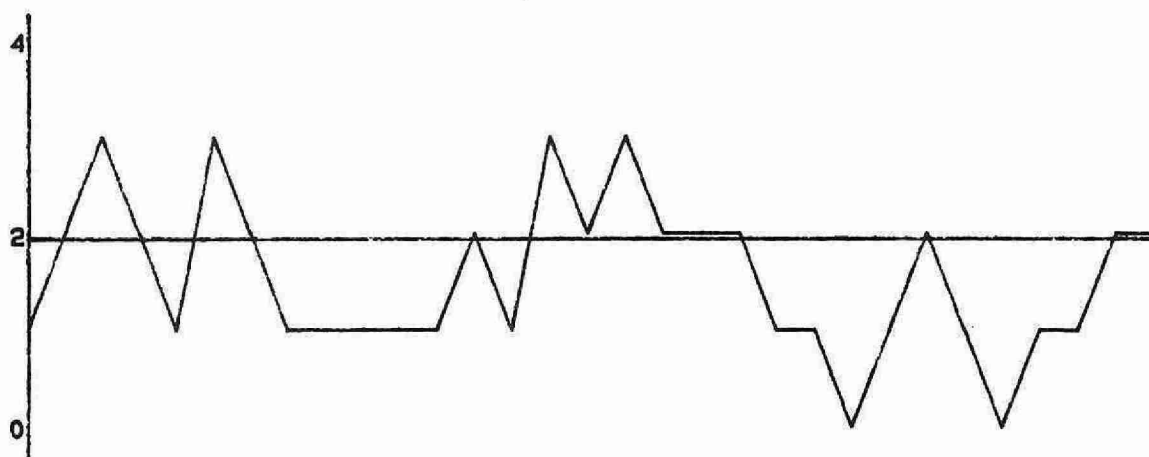
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean (2) s.d.	Coefficient of var. (%)
	59	0 - 20	0.9	22.1
	1	20 - 50	N/A	N/A
	0	50 - 100	N/A	N/A
	60	Overall	0.9	N/A

QUALITY CONTROL GRAPHS CLAY (% BY WT.)

FROM: 22/01/88
TO: 08/08/88

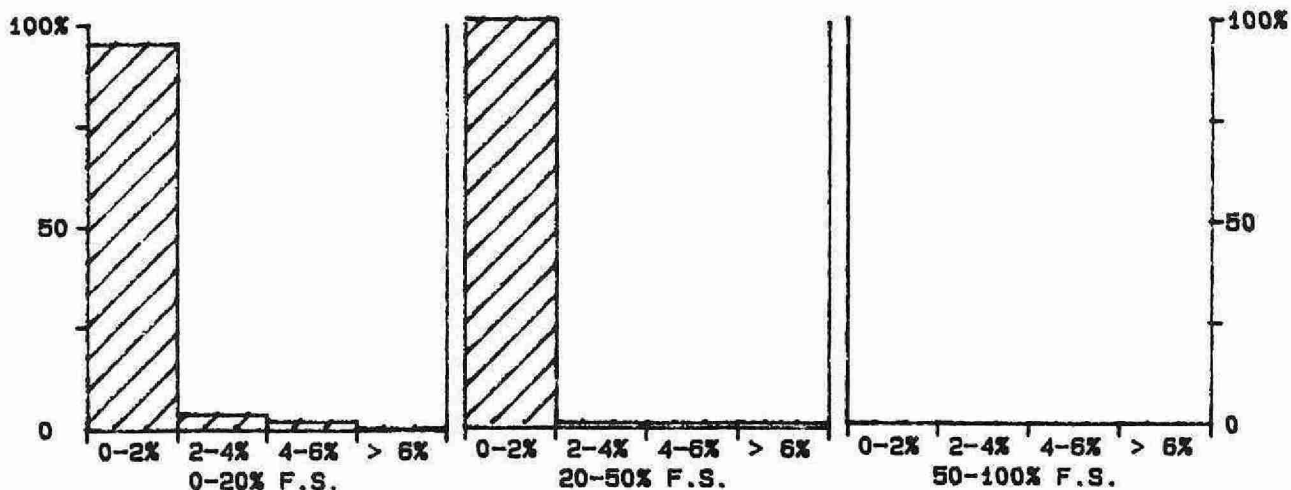


RECOVERY SAMPLE R1



RECOVERY SAMPLE R2

— EXPECTED VALUE



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 % BY WT.

***** COLOUR - TRUE *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 15/10/80
LIS Test Name Code	: COLTR	Units	: TCU
Work Station Code	: DOCC	Unit Code	: 340000
Method Code	: 1102KP	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes		

SAMPLING:

Quantity Required : 75 mL
Container : PET 500 ml-Jar

ANALYTICAL PROCEDURE:

True colour is measured on a settle sample colourimetrically in a system calibrated with acidified chloroplatinate standards. Colour is measured using a broadband blue filter. Turbidity effects are partially suppressed by using a broadband red filter. True colour is calculated from the two absorbance measurements using an empirically derived equation. Approximate absorbance: 0.05 at the full scale level.

INSTRUMENTATION:

Two colourimeters, one with broadband blue filter (400-450 nm) and the other with broadband red filter (660-740 nm). Colourimetric measurement is through a 4.0 cm. light path.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1.0 T value: 5

CALIBRATION:

Blank Only

CONTROLS:

Calibration : LTB plus 2 standards, e.g. QCA,QCB

NOTES:

Slope factor is changed whenever light source in a colourimeter or cell is replaced. This is accomplished by analyzing 7 standards.

COLOUR-TRUE (DOCC)
QUALITY CONTROL DATA FROM 08/01/88 TO 30/12/88

Lab: Dorset

Analytical Range: - to 100 TCU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	91	50	49	-1	1.6
b :	91	10	10	0	1.0
a+b :	91	60	59	-1	2.0
a-b :	91	40	39	-1	1.9

s.d.(AB): Sw(within run): 1.3 S(between runs): 1.3 S/Sw: 0.99

On any given day the calibration is accepted if the values obtained lie within the ranges:

53 to 67 for A+B
 35 to 45 for A-B

DUPLICATES:

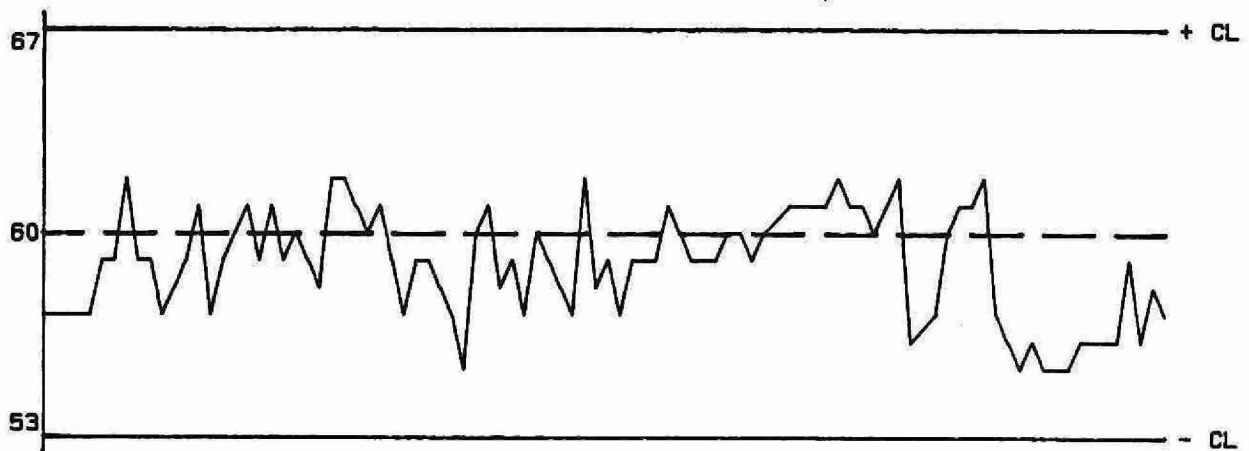
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
33	0 - 10	0.7	11.0
57	10 - 25	1.4	7.8
41	25 - 50	1.6	4.1
67	50 - 100	2.2	3.0
198	Overall	1.7	N/A

OTHER CHECKS:

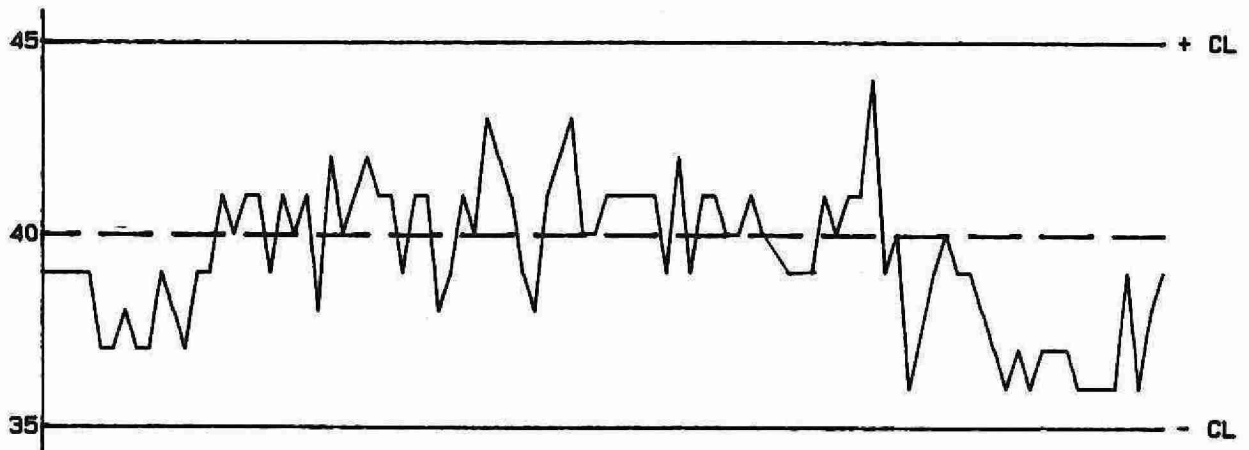
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	92	0	0.0

QUALITY CONTROL GRAPHS COLOUR-TRUE (DOCC) (TCU)

FROM: 08/01/88
TO: 30/12/88

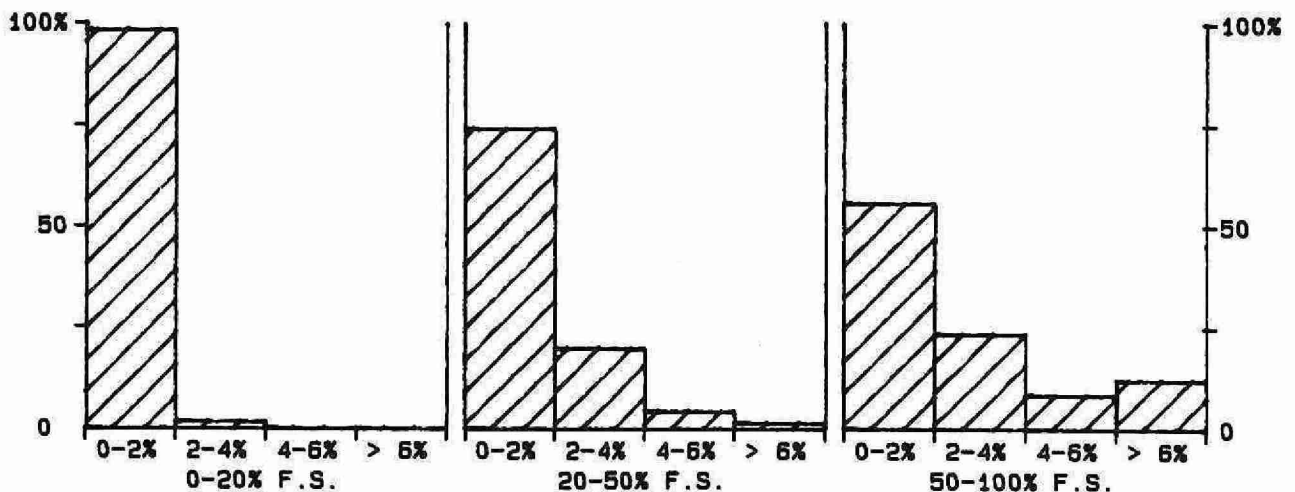


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-109-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 TCU

***** COLOUR - TRUE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 13/03/84
LIS Test Name Code	: COLTR	Units	: TCU
Work Station Code	: WCOL	Unit Code	: 340000
Method Code	: 102BC9	Supervisor	: M. Rawlings
Sample Type/Matrix	: Domestic Waters, Effluents, Surface Waters, Industrial Wastes, Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

True colour is measured colourimetrically on the supernatant of a settled sample in a system calibrated with acidified chloroplatinate standards. The sample stream is measured using a broadband blue filter. Residual turbidity effects are suppressed by using a broadband red filter and increased path length in the reference stream.
Approximate absorbance: 0.3 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system. Color measurement is through a 3.0 cm. light path using a broadband filter (400-450 nm). Turbidity measurement is through a 5.0 cm. light path using a different broadband filter (660-740 nm). Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

NOTES:

New procedure was initiated to conform with change in "Ontario Drinking Water Objectives"; copy of research study is available on request.
July, 1987: Automated data capture and processing by the WQS DCI system introduced.

COLOUR-TRUE-WCOL
QUALITY CONTROL DATA FROM 05/01/88 TO 20/12/88

Lab: Colourimetry

Analytical Range: - to 100.0 TCU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	77	70.0	70.0	0.0	0.31
b :	77	25.0	24.7	-0.3	0.66
a+b :	77	95.0	94.7	-0.3	0.82
a-b :	77	45.0	45.3	0.3	0.62
c :	78	25.0	24.7	-0.3	0.65
d :	78	7.5	7.4	-0.1	0.23
c+d :	78	32.5	32.1	-0.4	0.78
c-d :	78	17.5	17.3	-0.2	0.59

s.d.(AB): Sw(within run): 0.44 S(between runs): 0.52 S/Sw: 1.18
s.d.(CD): Sw(within run): 0.42 S(between runs): 0.49 S/Sw: 1.17

On any given day the calibration is accepted if the values obtained lie within the ranges:

91.6 to 98.4 for A+B
42.8 to 47.2 for A-B
29.6 to 35.4 for C+D
15.6 to 19.4 for C-D

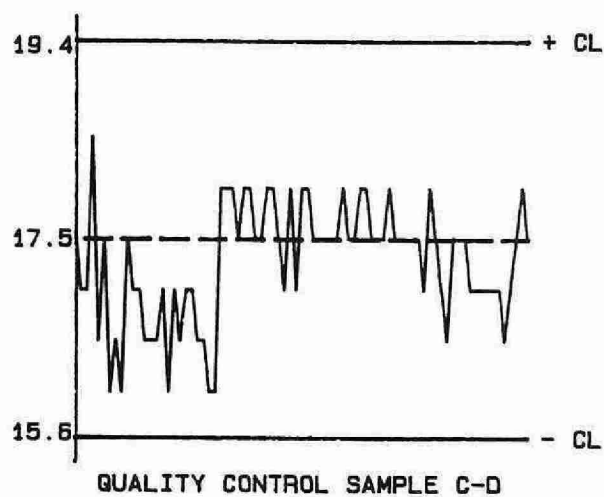
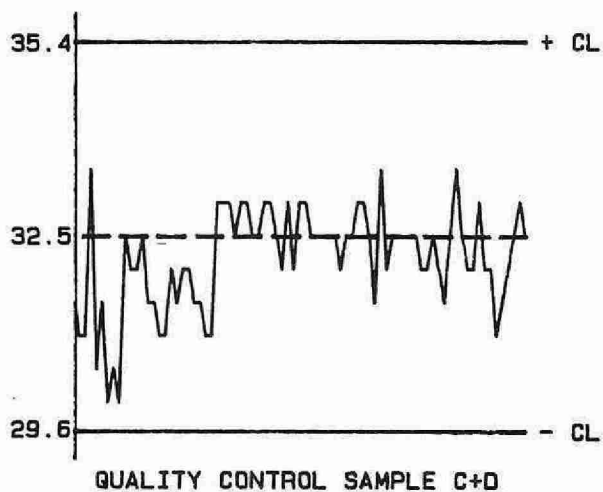
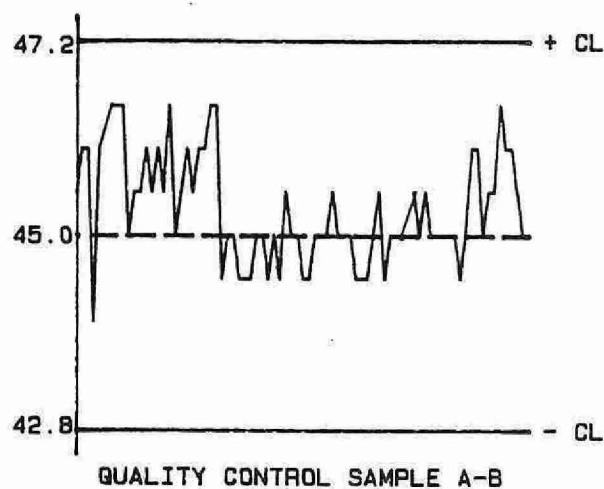
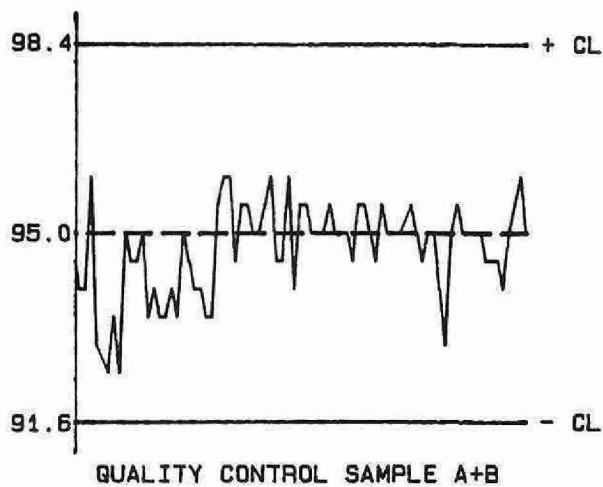
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
96	0.0 - 5.0	0.32	16.9
28	5.0 - 10.0	0.28	3.5
62	10.0 - 25.0	0.61	3.5
30	25.0 - 50.0	0.68	1.8
12	50.0 - 100.0	0.98	1.5
228	Overall	0.52	N/A

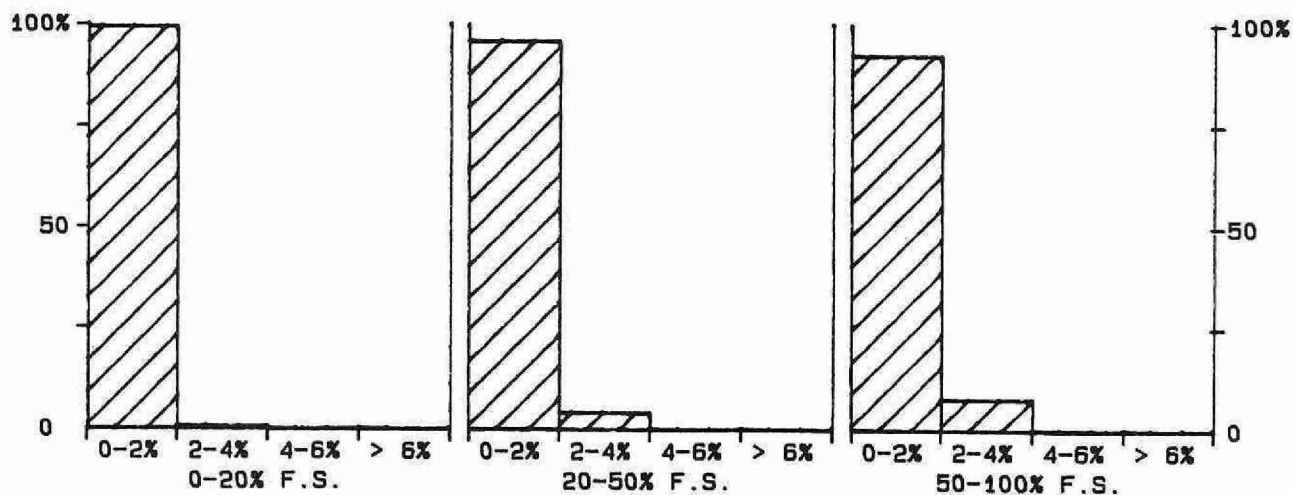
QUALITY CONTROL GRAPHS

COLOUR-TRUE-WCOL (TCU)

FROM: 05/01/88
TO: 20/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-112-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 TCU

***** CONDUCTIVITY *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/06/76
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: DOCC	Unit Code	: 350351
Method Code	: 0903CM	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation, Soil Leachates		

SAMPLING:

Quantity Required : 75 mL
Container : PET-500 ml Jars

ANALYTICAL PROCEDURE:

The sample is introduced into a jacketed conductivity cell and equilibrated to 25°C. The conductivity is read directly from a digital display.

INSTRUMENTATION:

Conductivity meter with cell enclosed in a water jacket; temperature controlled water circulator.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

None.

CONTROLS:

Calibration : LTB plus 4 standards, e.g. QCA, QCB, 147 uS/cm plus 717.7 uS/cm stds.

NOTES:

*T value is based on duplicate analyses at concentrations above the lowest range.

CONDUCTIVITY (DOCC)
QUALITY CONTROL DATA FROM 08/01/88 TO 22/12/88

Lab: Dorset

Analytical Range: - to 300 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	105	290	291	1	1.3
b :	105	74	74	0	1.0
a+b :	105	364	365	1	2.1
a-b :	105	216	217	1	1.1

s.d.(AB): Sw(within run): 0.8 S(between runs): 1.2 S/Sw: 1.49

On any given day the calibration is accepted if the values obtained lie within the ranges:

355 to 373 for A+B
 210 to 222 for A-B

DUPLICATES:

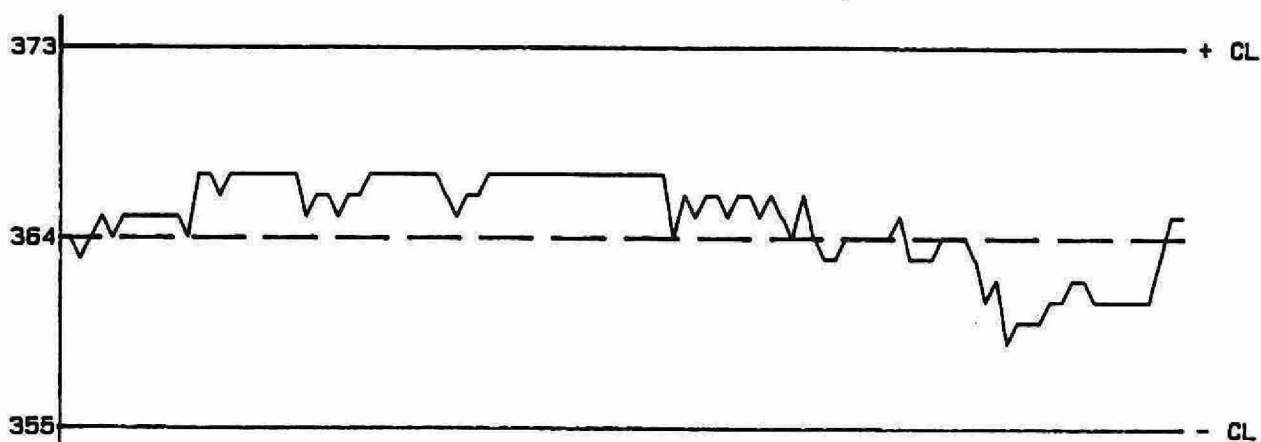
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
4	0.0 - 10.0	0.04	1.4
20	10.0 - 20.0	0.25	1.5
161	20.0 - 50.0	0.18	0.5
68	50 - 100	0.9	1.3
21	100 - 300	1.0	0.7
274	Overall	0.5	N/A

OTHER CHECKS:

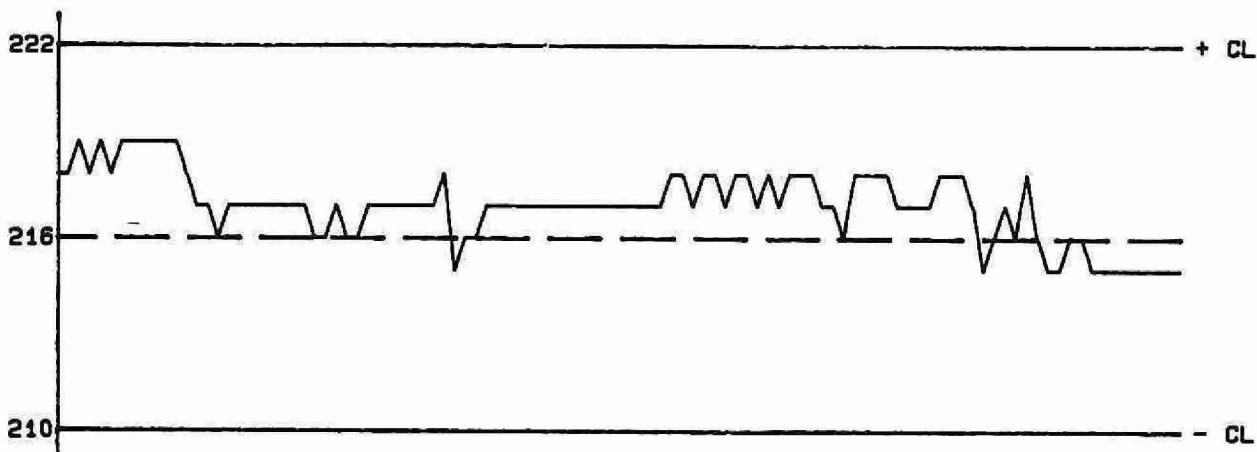
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	104	1	0.3

QUALITY CONTROL GRAPHS CONDUCTIVITY (DOCC) (US/CM)

FROM: 08/01/88
TO: 22/12/88

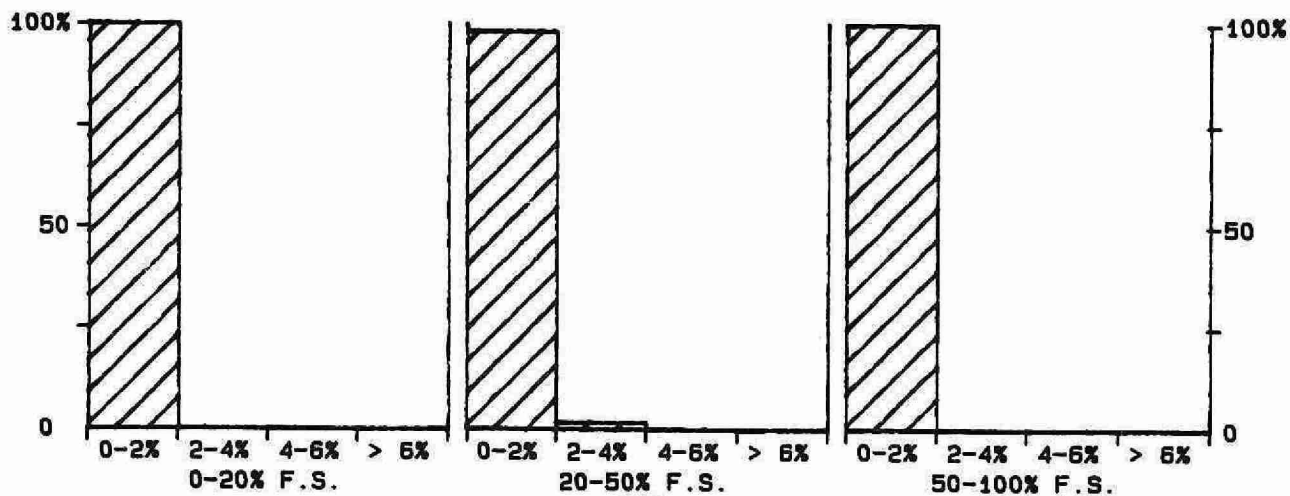


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-115-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 300 US/CM

***** CONDUCTIVITY *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: PRCON	Unit Code	: 350351
Method Code	: 002BI2	Supervisor	: F. Lo
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 15 mL
Container : Pet-500 mL Jars

ANALYTICAL PROCEDURE:

After equilibration at 25°C, The conductivity of the sample is measured.

INSTRUMENTATION:

Automated modular continuous flow conductivity system comprised of sampler, water bath, conductivity meter with cell, chart recorder.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

Compatibility between conductivity meter and chart recorder is confirmed by checking 3 standard resistances.

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Drift : 1 solution every 10 samples

MODIFICATIONS:

18/10/83 -Automated continuous flow system was introduced.
June 1988 -Workstation PRCON introduced to separate conductivity test from PRIC1 workstation.
Both stations continue to share the same autosampler.

NOTES:

A calibration standard for the ion chromatographic system is utilized as a drift control for the conductivity system, but its theoretical conductivity is unknown.

CONDUCTIVITY - PRCON
QUALITY CONTROL DATA FROM 05/01/88 TO 22/11/88

Lab: Ion Chromatography

Analytical Range: - to 100.0 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	80	44.5	45.0	0.5	1.69
b :	80	7.5	8.1	0.6	0.90
a+b :	80	52.0	53.1	1.1	2.48
a-b :	80	37.0	36.8	-0.2	1.06

s.d.(AB): Sw(within run): 0.75 S(between runs): 1.35 S/Sw: 1.81

On any given day the calibration is accepted if the values obtained lie within the ranges:

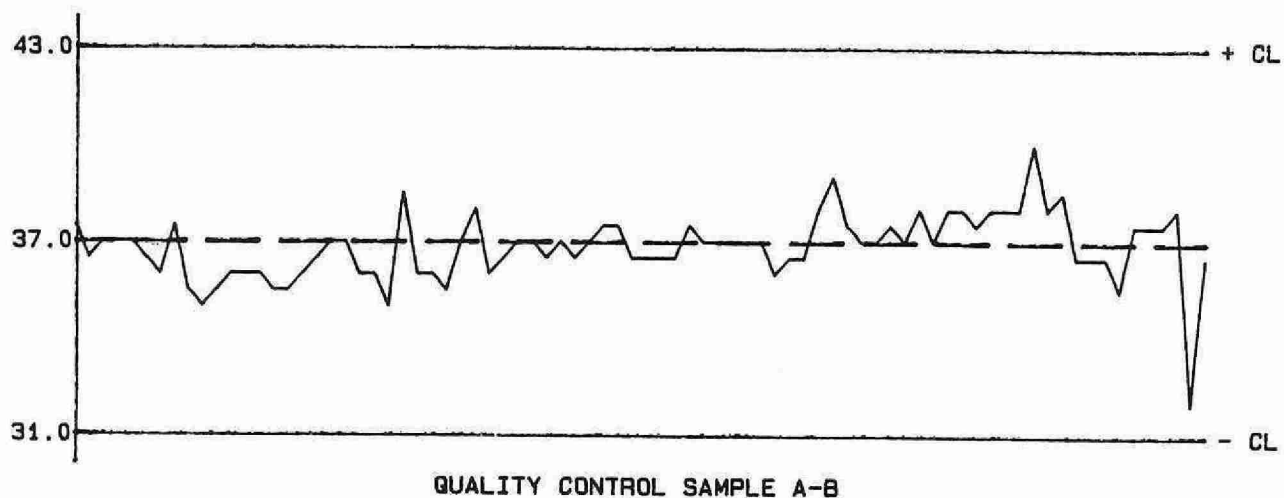
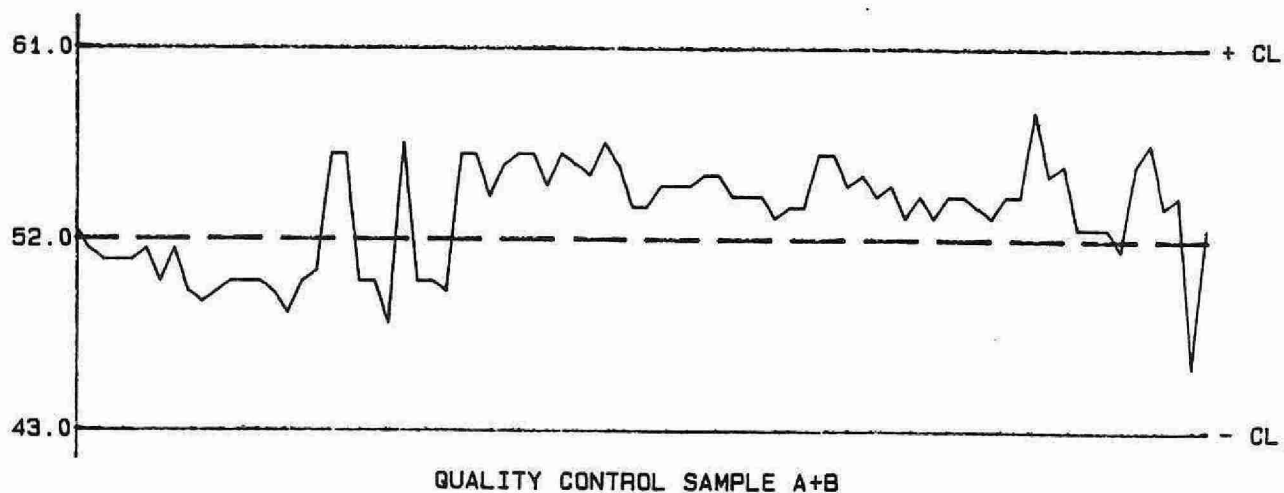
43.0 to 61.0 for A+B
 31.0 to 43.0 for A-B

DUPLICATES:

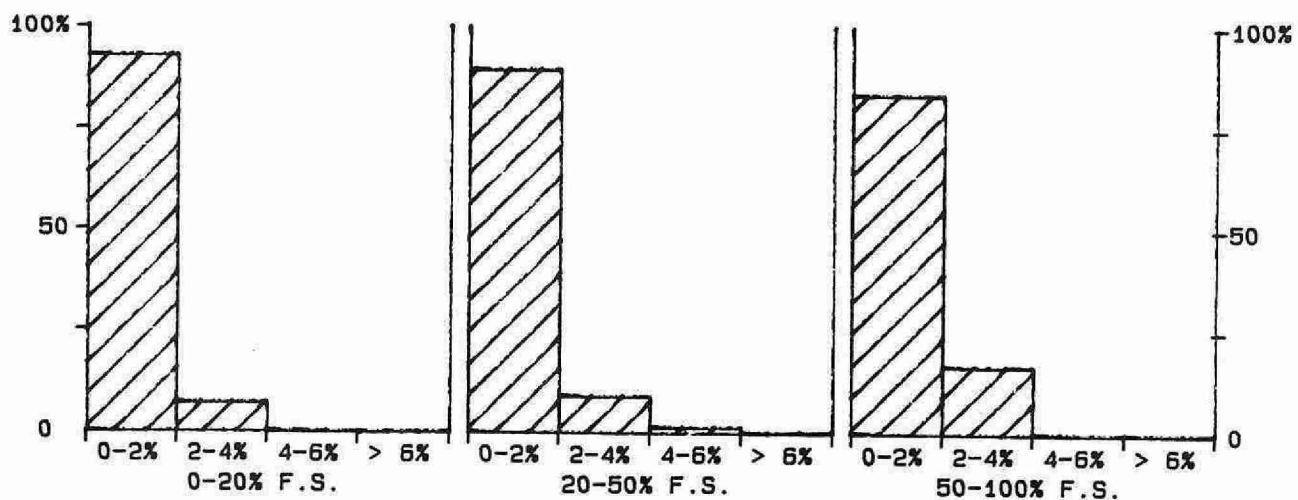
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
12	0.0 - 10.0	0.37	5.9
31	10.0 - 20.0	0.87	5.9
142	20.0 - 50.0	1.07	3.1
30	50.0 - 100.0	0.94	1.2
215	Overall	1.00	N/A

QUALITY CONTROL GRAPHS CONDUCTIVITY - PACON (US/CM)

FROM: 05/01/88
TO: 22/11/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-118-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 US/CM

***** CONDUCTIVITY *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/04/74
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: RATS	Unit Code	: 350351
Method Code	: 002BI2	Supervisor	: F. Lo
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C, the conductivity of the sample is measured. N.B. pH, Gran alkalinity and Total fixed endpoint alkalinity are determined simultaneously.

INSTRUMENTATION:

Automated modular continual flow conductivity system comprising of a sampler, water bath, conductivity meter with cell plus microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: In run standards throughout the run (diluted tap water 20% V/V)

MODIFICATIONS:

01/04/84 -Automated system introduced for conductivity range 20-1000 uS/cm.
09/05/85 -RATS - River Automated Titration System - designed for the determination of conductivity, pH, alkalinity-total fixed endpoint and alkalinity-Gran. The system is microcomputer controlled with data reduction and direct computer input (DCI) capabilities.

CONDUCTIVITY-RATS
 QUALITY CONTROL DATA FROM 07/01/88 TO 28/12/88

Lab: Titration

Analytical Range: - to 2000 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	131	718	715	-3	1.6
b :	131	147	148	1	0.9
a+b :	131	865	863	-2	1.9
a-b :	131	571	567	-4	1.7
c :	131	147.0	147.9	0.9	0.86
d :	131	37.1	38.5	1.4	0.34
c+d :	131	184.1	186.4	2.3	0.96
c-d :	131	109.9	109.4	-0.5	0.89

s.d.(AB): Sw(within run): 1.2 S(between runs): 1.3 S/Sw: 1.08
 s.d.(CD): Sw(within run): 0.63 S(between runs): 0.65 S/Sw: 1.04

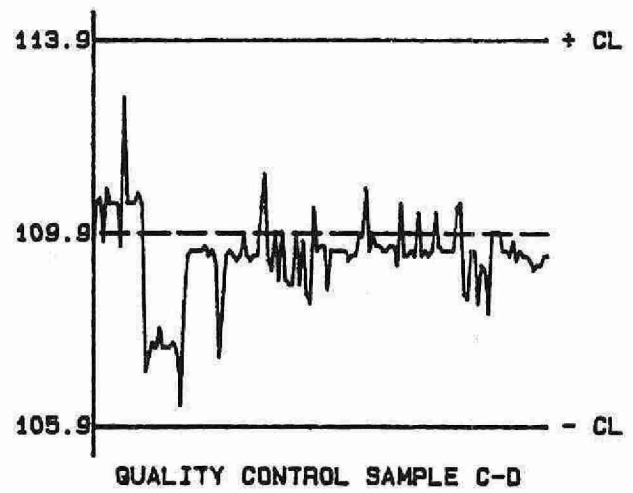
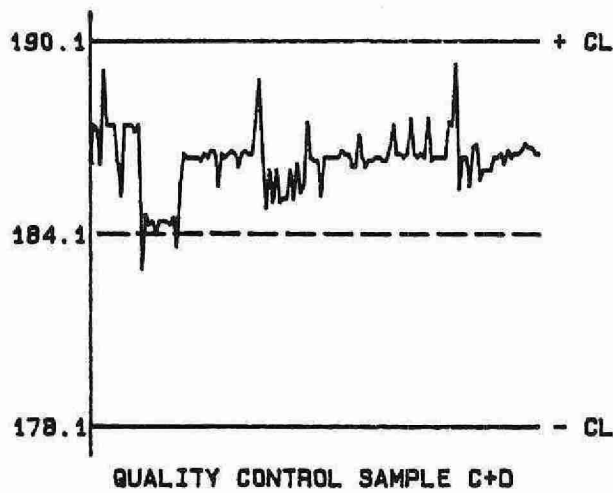
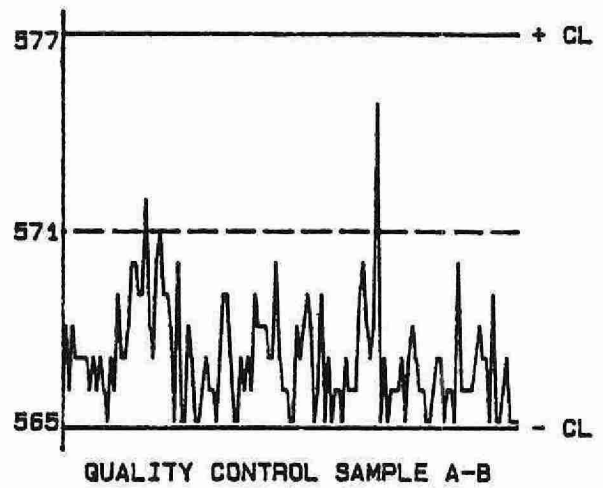
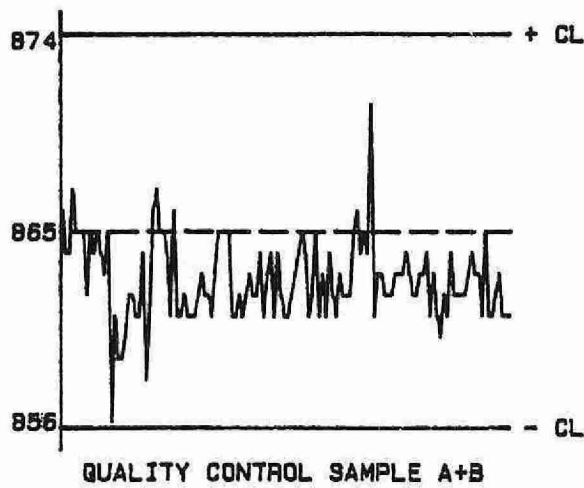
On any given day the calibration is accepted if the values obtained lie within the ranges:

856 to 874 for A+B
 565 to 577 for A-B
 178.1 to 190.1 for C+D
 105.9 to 113.9 for C-D

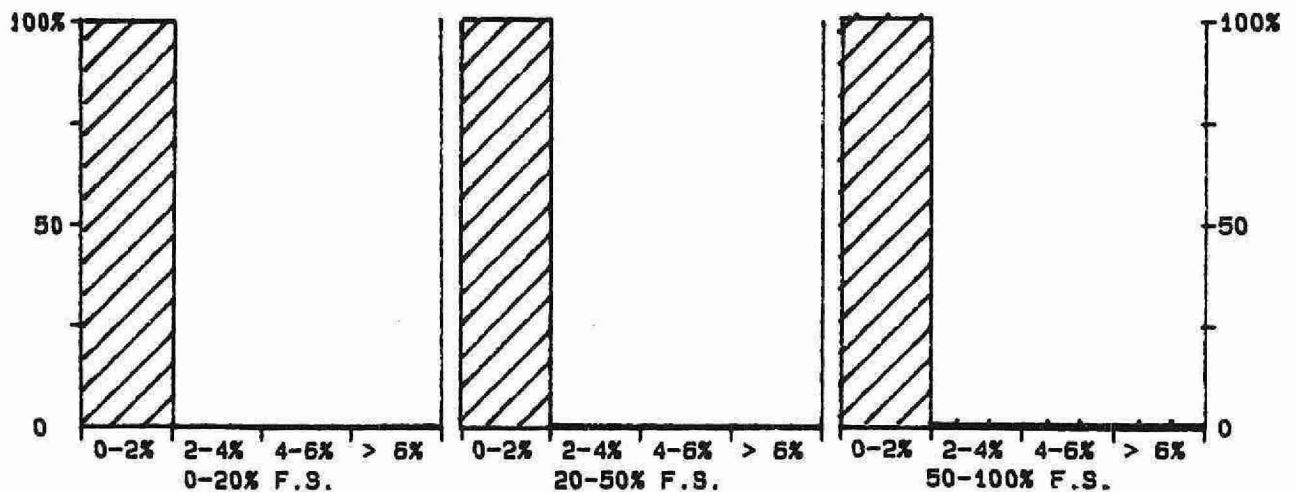
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	38	0 - 50	1.1	3.5
	64	50 - 200	1.1	1.0
	145	200 - 500	1.2	0.3
	85	500 - 1000	2.5	0.4
	10	1000 - 2000	3.9	0.3
	342	Overall	1.7	N/A

QUALITY CONTROL GRAPHS CONDUCTIVITY-RATS (US/CM)

FROM: 07/01/88
TO: 28/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2000 US/CM

***** CONDUCTIVITY *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/04/74
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: WATS	Unit Code	: 350351
Method Code	: 002BI2	Supervisor	: F. Lo
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C, the conductivity of the sample is measured. N.B. pH, Gran alkalinity, and Total fixed endpoint alkalinity are determined simultaneously.

INSTRUMENTATION:

Automated modular continual flow conductivity system comprising of a sampler, water bath, conductivity meter with cell plus microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: In run standards throughout the run (diluted tap water 50% V/V)

MODIFICATIONS:

14/03/86 -WATS workstation was introduced. This system was designed to determine pH, conductivity, and total fixed endpoint alkalinity; it is microcomputer controlled and has direct computer (DCI) capabilities.

CONDUCTIVITY-WATS
QUALITY CONTROL DATA FROM 04/01/88 TO 28/12/88

Lab: Titration

Analytical Range: - to 2000 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	125	1413	1414	1	6.1
b :	125	718	719	1	3.2
a+b :	125	2131	2133	2	8.1
a-b :	125	695	695	0	5.5
c :	124	718.0	719.3	1.3	3.12
d :	125	147.0	148.3	1.3	1.33
c+d :	124	865.0	867.6	2.6	3.76
c-d :	124	571.0	571.0	0.0	2.96

s.d.(AB): Sw(within run): 3.9 S(between runs): 4.9 S/Sw: 1.25
s.d.(CD): Sw(within run): 2.09 S(between runs): 2.40 S/Sw: 1.15

On any given day the calibration is accepted if the values obtained lie within the ranges: -

2108 to 2154 for A+B
680 to 710 for A-B
854.2 to 875.8 for C+D
563.8 to 578.2 for C-D

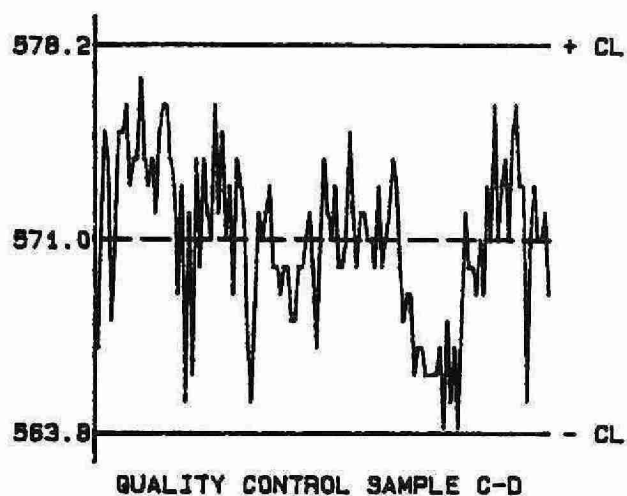
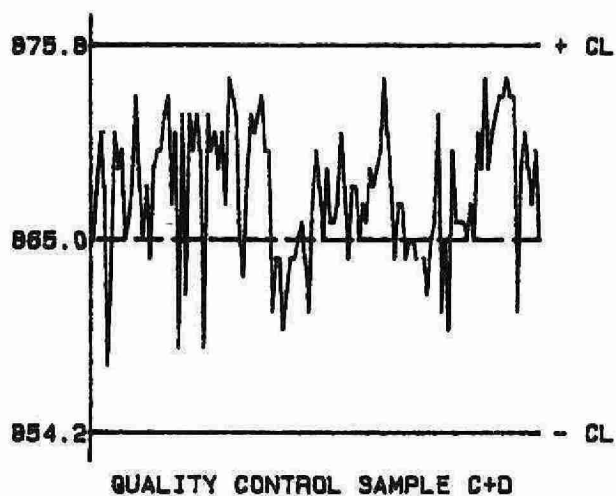
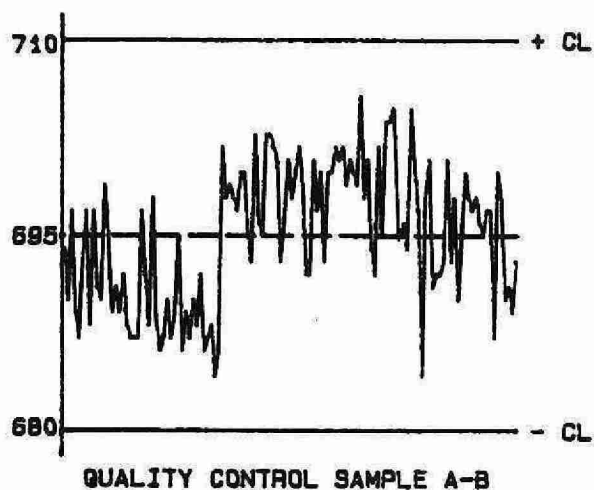
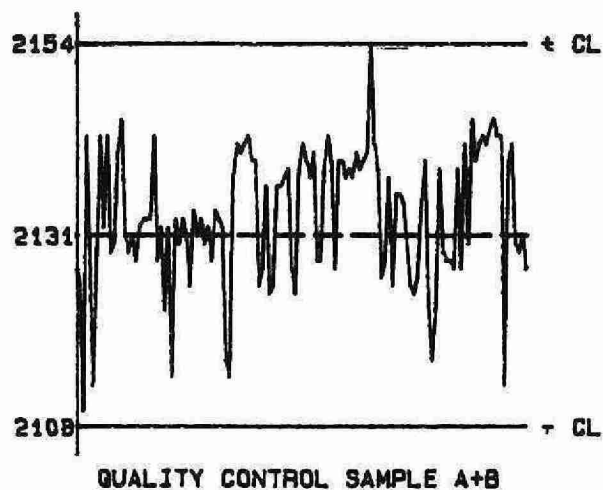
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
10	0.0 - 50.0	0.91	6.7
63	50 - 200	2.2	1.9
146	200 - 500	2.9	0.9
103	500 - 1000	5.4	0.8
19	1000 - 2000	12.7	1.0
341	Overall	4.7	N/A

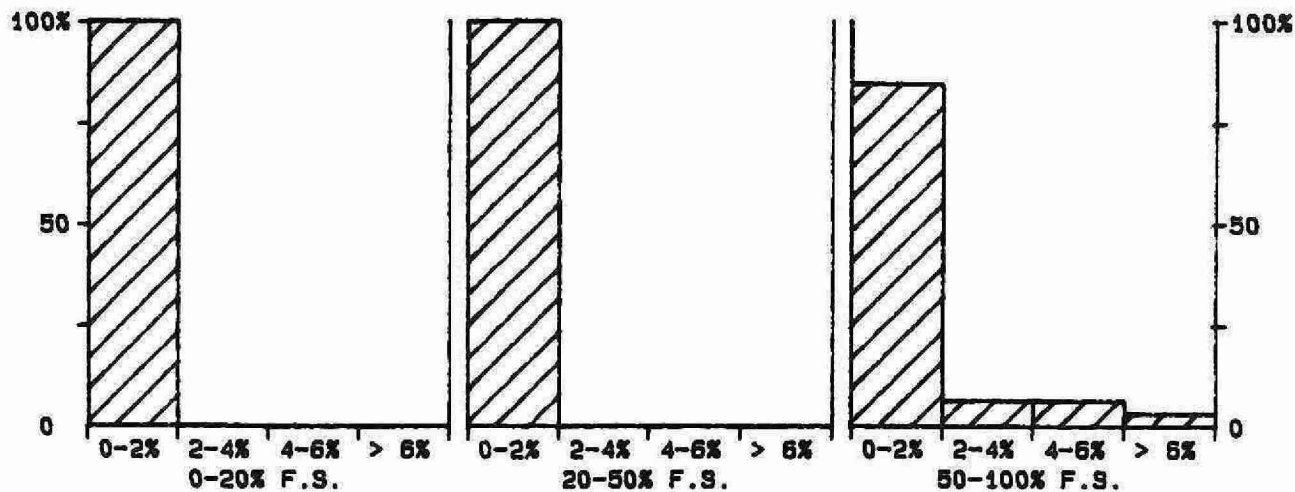
QUALITY CONTROL GRAPHS

CONDUCTIVITY-WATS (US/CM)

FROM: 04/01/88
TO: 28/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-124-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2000 US/CM

***** CONDUCTIVITY *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 20/05/87
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: WQSDIRT	Unit Code	: 350351
Method Code	: 004AB4	Supervisor	: F. Lo
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required : 75 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C, the conductivity of the sample is measured; samples are filtered first if necessary. Analysis is performed on supernatant or filtrate.

INSTRUMENTATION:

Conductivity meter with cell enclosed in a water jacket; temperature controlled water circulator.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 5 T value: 25

CALIBRATION:

None

CONTROLS:

Calibration : BL plus 3 standards, e.g. QCA

MODIFICATIONS:

20/05/87 -Workstation introduced to Titration lab using conductivity meter with autotemperature correction.
15/03/88 -Used a CDM83 Radiometer Conductivity Meter with a temperature jacketed CDC335 Radiometer Conductivity cell. Added a Q.C. solution at 1413 uS/cm.

CONDUCTIVITY-WQSDIRT
QUALITY CONTROL DATA FROM 21/03/88 TO 02/12/88

Lab: Titration

Analytical Range: - to 10000 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	63	6668	6648	-20	32.4
b :	63	2767	2772	5	15.3
a+b :	63	9435	9420	-15	40.2
a-b :	63	3901	3877	-24	31.0
c :	62	1413	1417	4	9.5
d :	62	717.8	717.1	-0.7	4.68
c+d :	62	2130.8	2134.0	3.2	11.94
c-d :	62	695.2	699.8	4.6	9.07

s.d.(AB): Sw(within run): 21.9 S(between runs): 25.3 S/Sw: 1.16
s.d.(CD): Sw(within run): 6.4 S(between runs): 7.5 S/Sw: 1.17

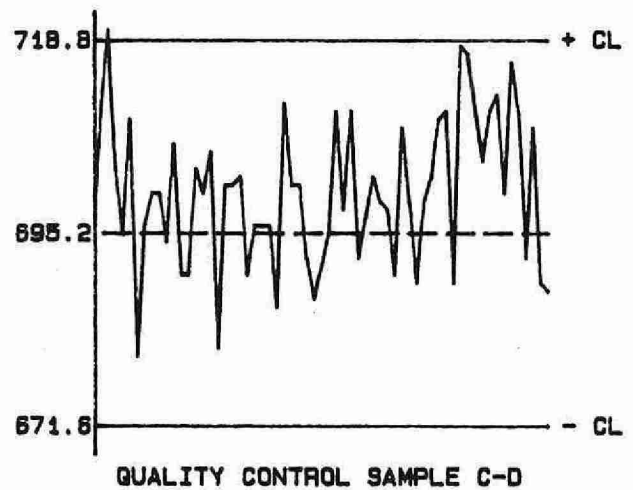
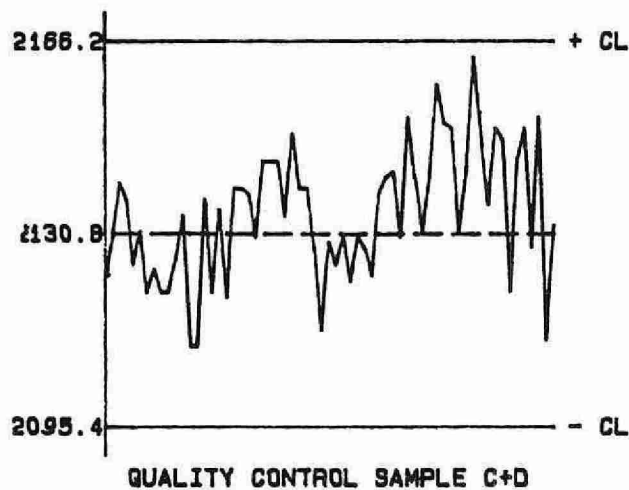
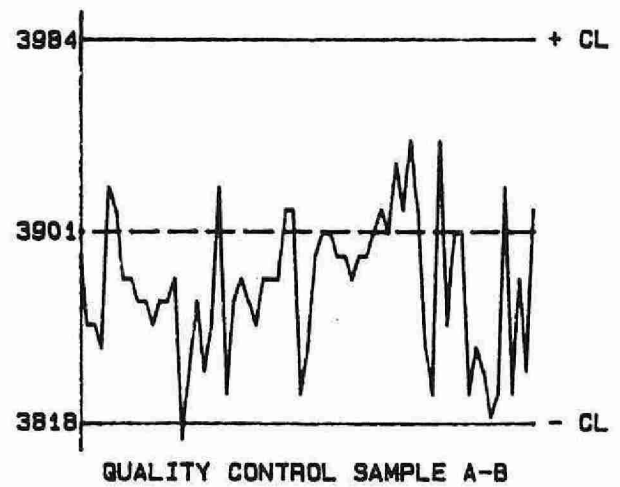
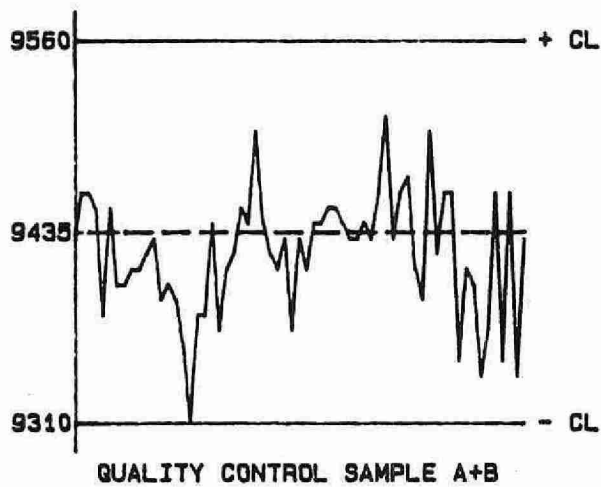
On any given day the calibration is accepted if the values obtained lie within the ranges:

9310 to 9560 for A+B
3818 to 3984 for A-B
2095.4 to 2166.2 for C+D
671.6 to 718.8 for C-D

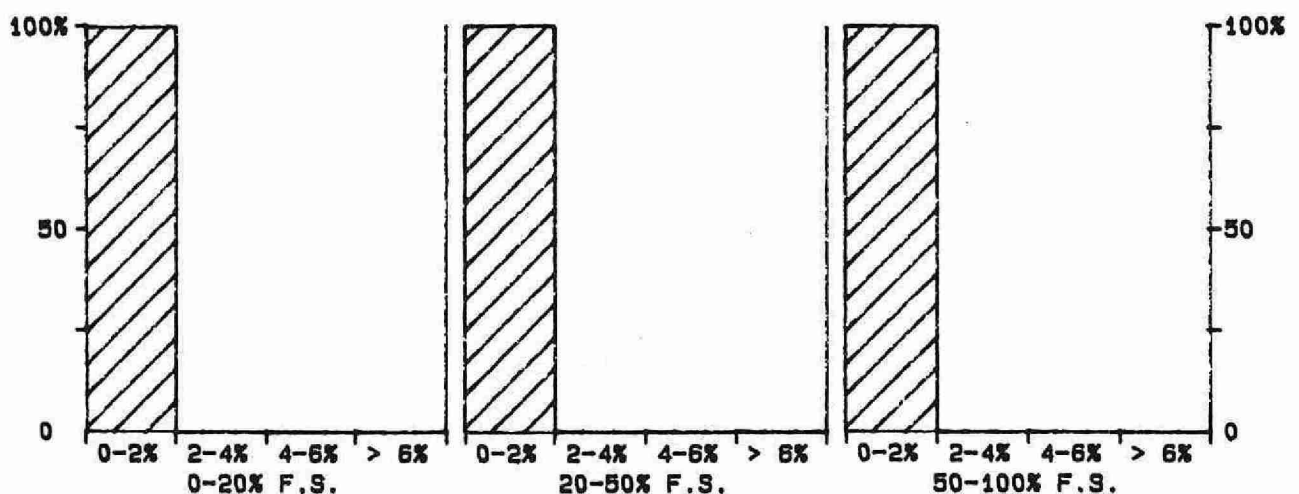
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	89	0.0 - 1000.0	5.61	1.2
	10	1000 - 2000	16.0	1.2
	4	2000 - 4000	11.2	0.5
	4	4000 - 7500	17.0	0.3
	0	7500 - 10000	N/A	N/A
	107	Overall	8.1	N/A

QUALITY CONTROL GRAPHS CONDUCTIVITY WQSDIRT (US/CM)

FROM: 21/03/88
TO: 02/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-127-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10000 US/CM

*** TOTAL COPPER - SOIL ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: CUUT	Units	: ug/g as Cu
Work Station Code	: DOHMTTE	Unit Code	: 073829
Method Code	: 551AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried and ground to <150 μm .

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Cu by AAS at 324.8 N.M. using an air-acetylene flame.

Approximate absorbance: 0.3 at the full scale value.

Lead, nickel and zinc are also determined on the same extract.

INSTRUMENTATION:

- Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types,
2 method blanks.

Drift : BBL plus 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/01/83 -Hot block temperature increased from 160°C to 175°C

06/01/86 -Samples analyzed on Varian AAS1275 (replacing Perkin Elmer 5000)

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal.

Values for recoveries are unknown - average value used.

TOTAL COPPER - SOIL
QUALITY CONTROL DATA FROM 14/03/88 TO 15/11/88

Lab: Dorset Soils

Analytical Range: - to 50.0 ug/g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	29	37.0	36.8	-0.2	1.06
b :	29	13.0	13.0	0.0	1.34
a+b :	29	50.0	49.8	-0.2	1.51
a-b :	29	24.0	23.8	-0.2	1.89

s.d.(AB): Sw(within run): 1.34 S(between runs): 1.21 S/Sw: 0.90

On any given day the calibration is accepted if the values obtained lie within the ranges:

42.5 to 57.5 for A+B
 19.0 to 29.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	28	13.5	13.7	1.09
r2 :	29	15.5	15.7	1.47
r3 :	27	13.0	13.3	1.27

DUPLICATES:

	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	52	0.0 - 10.0	1.01	20.2
	25	10.0 - 20.0	1.12	8.3
	9	20.0 - 50.0	0.81	2.4
	86	Overall	1.02	N/A

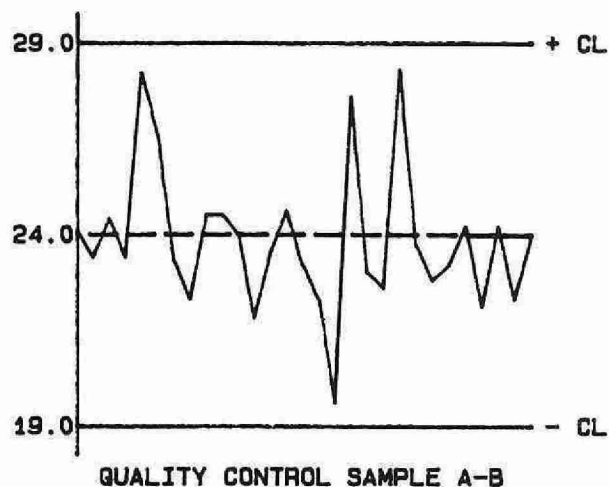
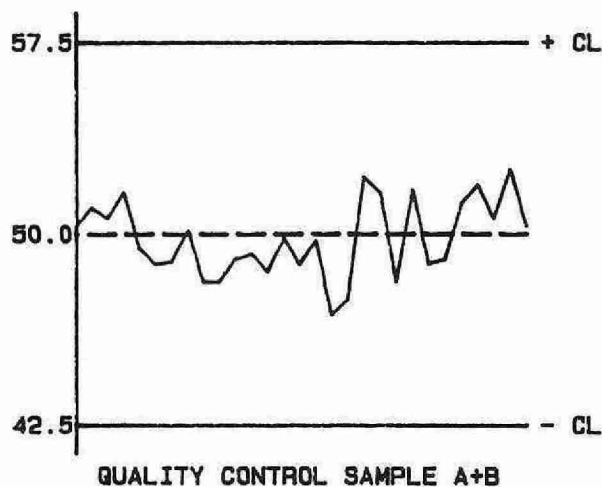
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	29	0.0	0.19

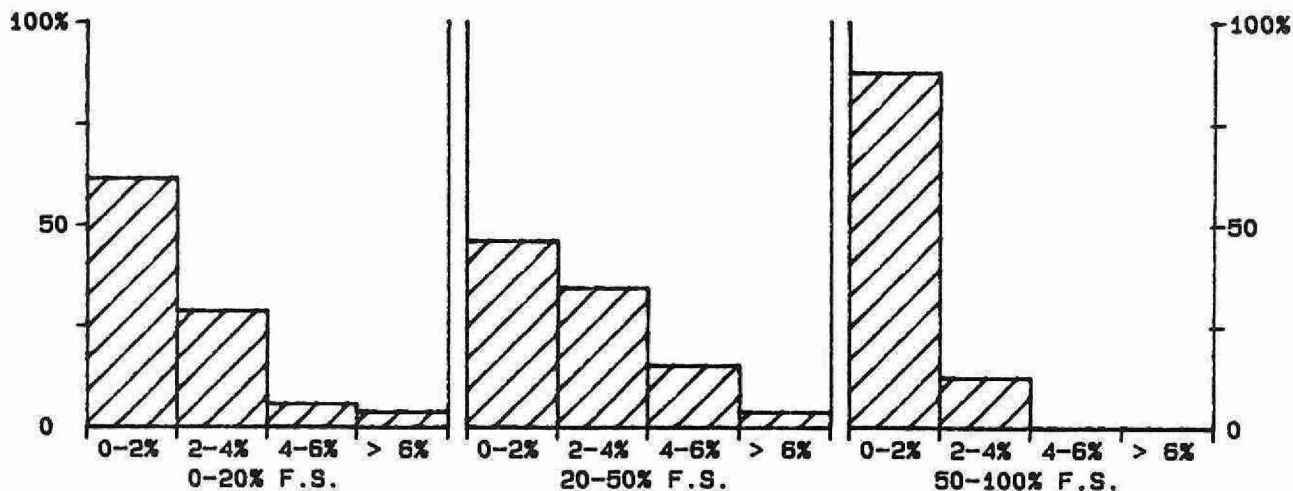
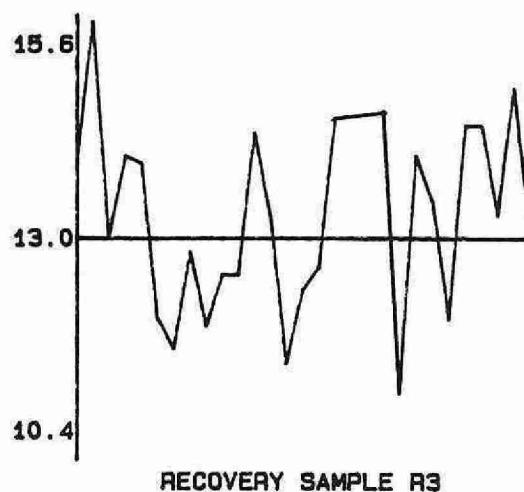
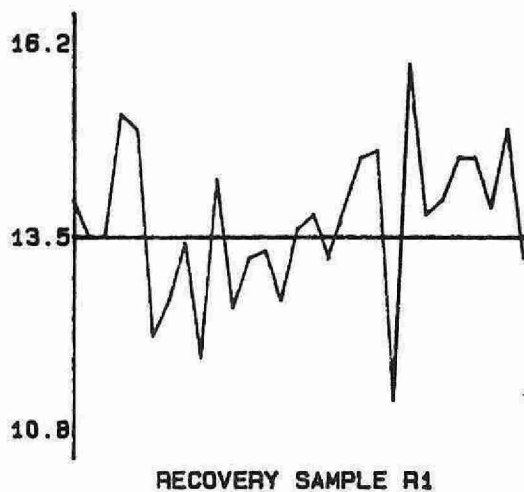
QUALITY CONTROL GRAPHS

TOTAL COPPER-SOIL (UG/G)

FROM: 14/03/88
TO: 15/11/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-130-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 50 UG/G

*****COPPER*****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	
LIS Test Name Code:	CUUT	Units	: ug/l as Cu
Work Station Code :	DOASV	Unit Code	: 063829
Method Code	: 001PP2	Supervisor	: F.Tomassini
Sample Type/Matrix:	Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required: 100 mL
Container : 500 mL, acid washed Nalgene Teflon container, bagged
in a clean room

ANALYTICAL PROCEDURE:

Samples are acidified to 0.1% using Seastar nitric acid in a clean room. Oxygen is removed by nitrogen gas and samples are analyzed using anodic stripping voltammetry on a hanging mercury drop electrode. Change in current when copper is stripped from mercury drop is proportional to concentration.

INSTRUMENTATION:

Metrohm 646 VA Processor with Model 675 VA Sample Changer

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.3 T value: 1.5

CALIBRATION:

BL plus 2 standards daily

CONTROL:

Calibration : BL plus 2 standards, e.g. QCA and EPA standard
Drift : End of every run (approximately every 8 samples)

TOTAL COPPER (DOASY)
QUALITY CONTROL DATA FROM 04/01/88 TO 20/12/88

Lab: Dorset

Analytical Range: - to 4.00 ug/l as Cu

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	102	3.60	3.72	0.12	0.460
b :	98	0.90	1.10	0.20	0.266
a+b :	89	4.50	4.82	0.32	0.515
a-b :	89	2.70	2.63	-0.07	0.568

s.d.(AB): Sw(within run): 0.402 S(between runs): 0.376 S/Sw: 0.94

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.54 to 8.46 for A+B
0.06 to 5.34 for A-B

DUPLICATES:

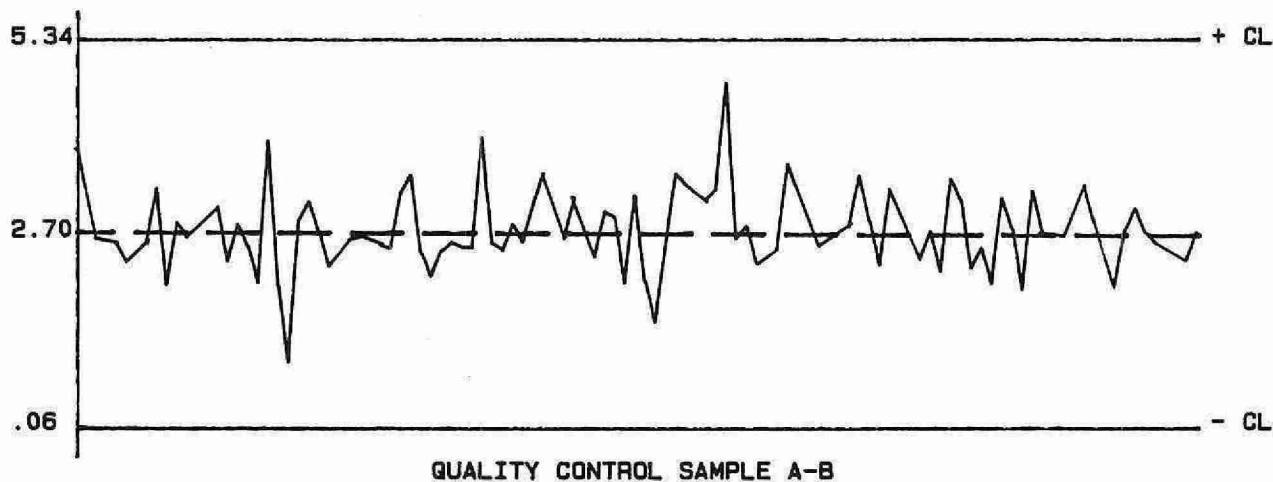
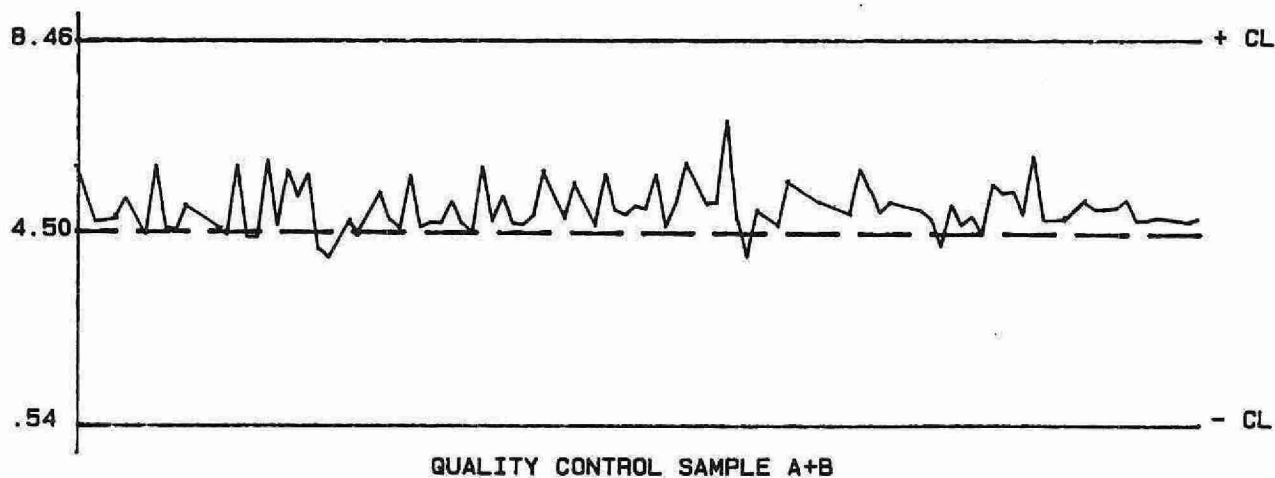
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
7	0.00 - 0.50	0.058	13.9
29	0.50 - 1.00	0.179	24.3
16	1.00 - 1.50	0.258	21.0
6	1.50 - 3.00	0.135	7.2
0	3.00 - 4.00	N/A	N/A
58	Overall	0.191	N/A

OTHER CHECKS:

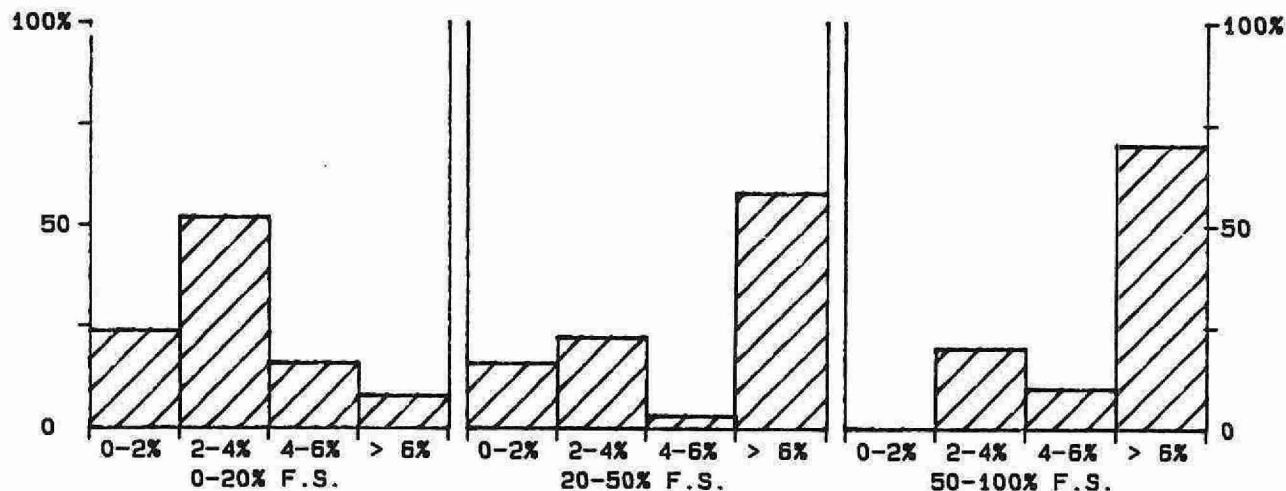
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	110	0.19	0.337

QUALITY CONTROL GRAPHS TOTAL COPPER (DOASV) (UG/L AS CU)

FROM: 04/01/88
TO: 20/12/88



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)



***** FLUORIDE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: Before '74
LIS Test Name Code	: FFIDUR	Units	: mg/L as F
Work Station Code	: WFNO3	Unit Code	: 064809
Method Code	: 003AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Domestic Waters, Surface Waters, Leachates, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Using an automated flow system the sample is distilled in the presence of sulphuric acid at 160°C; the distillate is then reacted (in an acetic acid-acetate buffer media) with Alizarin Fluorine Blue and lanthanum nitrate to form a ternary Alizarin Blue-lanthanide-fluoride complex. Approximate absorbance: 0.8 at the full scale level.

INSTRUMENTATION:

Modular continuous flow colourimetric system plus a distillation module. Colourimetric measurement is through a 5.0 cm. light path at 630 nm.
Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.01	T value: 0.05
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CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

MODIFICATIONS:

1985 -WFF dropped and all samples now routed to WFNO3
1986 -Automated data capture and reduction (DCI) introduced.

FLUORIDE-WFNO3-F
QUALITY CONTROL DATA FROM 01/03/88 TO 15/12/88

Lab: Colourimetry

Analytical Range: - to 2.00 mg/L as F

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	100	1.60	1.61	0.01	0.012
b :	100	0.80	0.80	0.00	0.008
a+b :	100	2.40	2.42	0.02	0.015
a-b :	100	0.80	0.81	0.01	0.014
c :	100	0.80	0.80	0.00	0.008
d :	100	0.16	0.16	0.00	0.007
c+d :	100	0.96	0.97	0.01	0.012
c-d :	100	0.64	0.64	0.00	0.008

s.d.(AB): Sw(within run): 0.010 S(between runs): 0.010 S/Sw: 1.03
s.d.(CD): Sw(within run): 0.006 S(between runs): 0.008 S/Sw: 1.33

On any given day the calibration is accepted if the values obtained lie within the ranges:

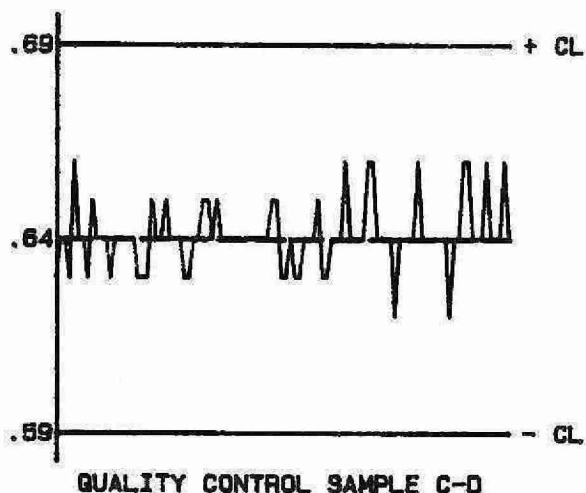
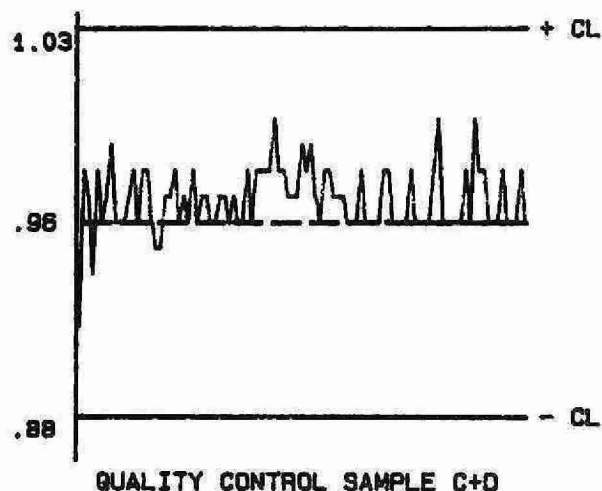
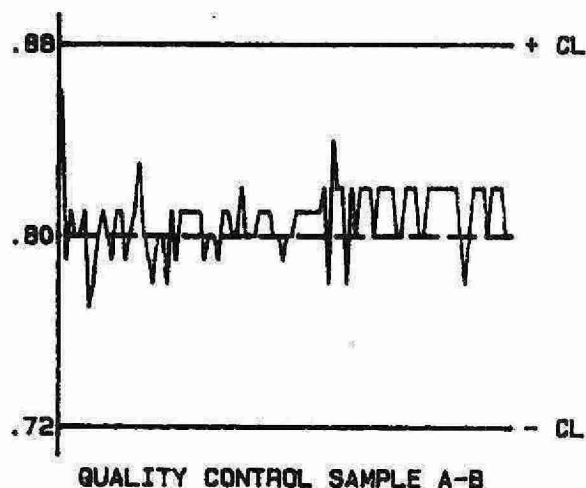
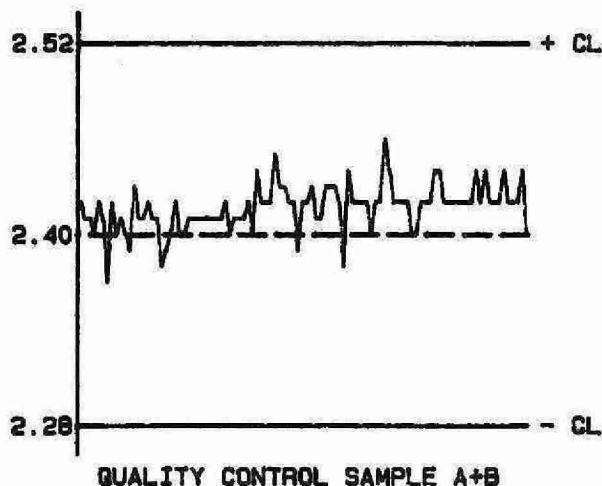
2.28 to 2.52 for A+B
0.72 to 0.88 for A-B
0.88 to 1.03 for C+D
0.59 to 0.69 for C-D

DUPLICATES:

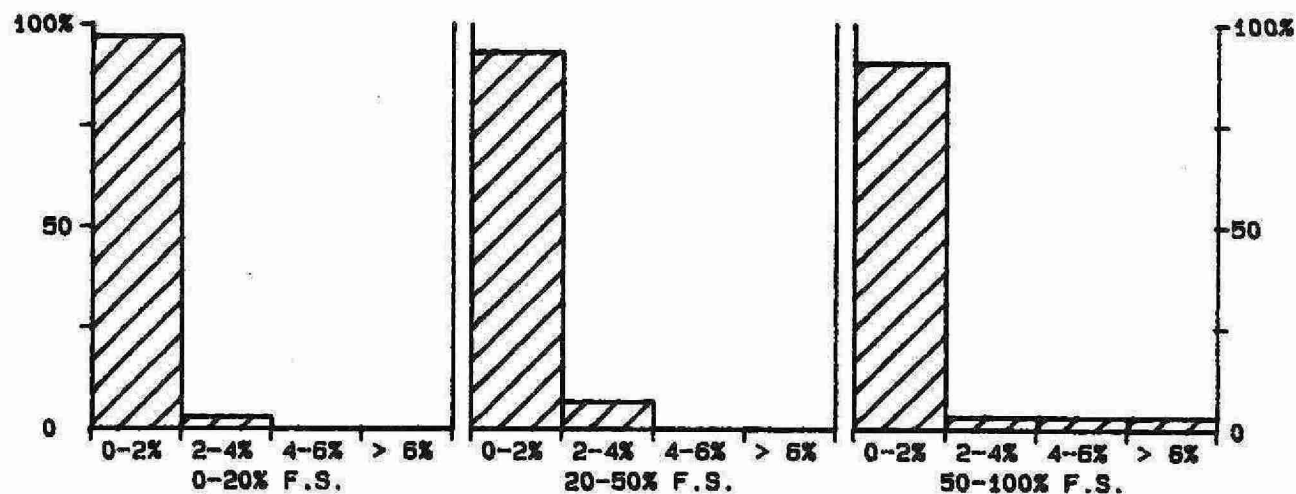
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
196	0.00 - 0.20	0.011	12.7
38	0.20 - 0.50	0.013	4.5
25	0.50 - 1.00	0.016	1.9
29	1.00 - 2.00	0.035	2.8
288	Overall	0.016	N/A

QUALITY CONTROL GRAPHS FLUORIDE-WFN03-F (MG/L AS F)

FROM: 01/03/88
TO: 15/12/88



— EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 MG/L AS F

***** FLUORIDE *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: FFIDUR	Units	: ug/L as F
Work Station Code	: DOSPF	Unit Code	: 063809
Method Code	: 001AIE	Supervisor	: A. Neary
Sample Type/Matrix	: Precipitation, Lakes, and Streams		

SAMPLING:

Quantity Required : 50 mL
Container : Plastic

SAMPLE PREPARATION:

None

ANALYTICAL PROCEDURE:

Fluoride is determined via an automated flow system for which the detector is a specific ion electrode; prior to measurement the sample is mixed with a high ionic strength buffer containing; sodium citrate, disodium ethylenediaminetetraacetate (EDTA), phosphoric acid, and sufficient sodium hydroxide to obtain pH 6.7.

INSTRUMENTATION:

Automated modular continuous flow ion specific electrode system.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL plus 1 standard in duplicate
Interference : Combined fluoride and aluminum standard confirms that aluminum is not an interference.

MODIFICATIONS:

01/01/82 -The above procedure is not described in HAMES, but a copy of the development report is available on request. The manual procedure in HAMES for the determination of fluoride by specific ion electrode is similar.

NOTES:

At the present time this procedure is restricted to special projects. Values for recoveries are based upon the average recovery value obtained.

FLUORIDE
QUALITY CONTROL DATA FROM 04/01/88 TO 20/12/88

Lab: Dorset Soils

Analytical Range: - to 70.0 ug/L as F

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	82	48.0	48.1	0.1	1.15
b :	82	24.0	23.8	-0.2	0.77
a+b :	82	72.0	71.9	-0.1	1.75
a-b :	82	24.0	24.3	0.3	0.86

s.d.(AB): SW(within run): 0.61 S(between runs): 0.98 S/SW: 1.61

On any given day the calibration is accepted if the values obtained lie within the ranges:

67.5 to 76.5 for A+B
 21.0 to 27.0 for A-B

DUPLICATES:

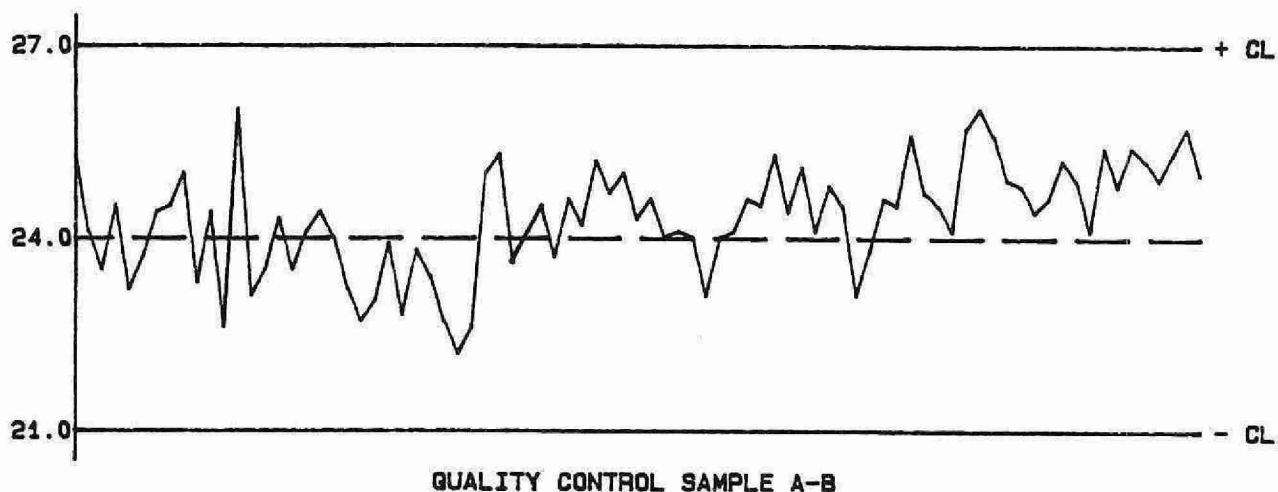
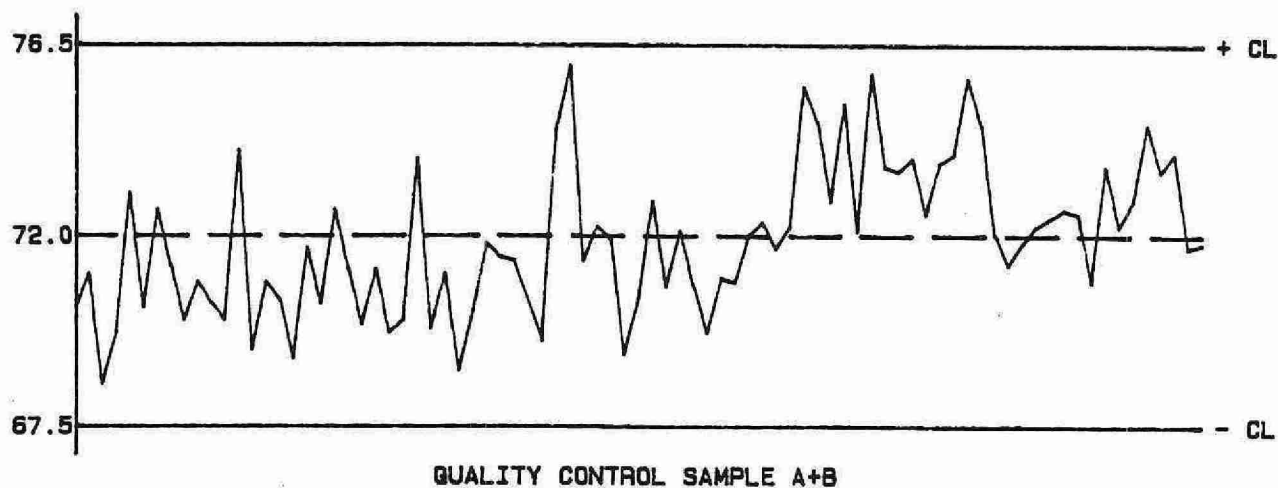
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
43	0.0 - 20.0	0.63	5.8
198	20.0 - 50.0	0.85	2.2
47	50.0 - 70.0	0.97	1.7
288	Overall	0.84	N/A

OTHER CHECKS:

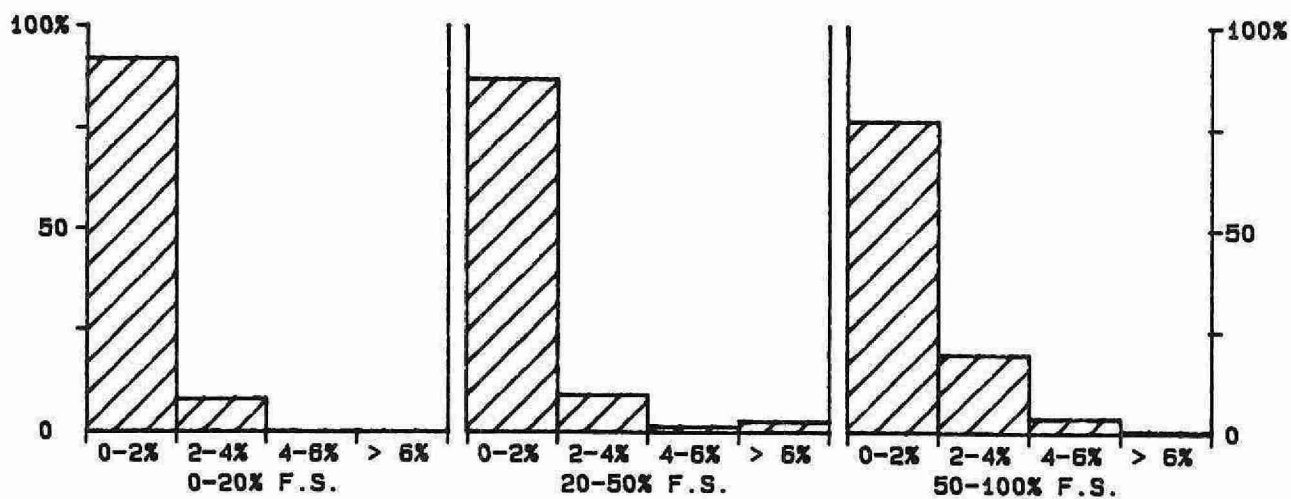
	Number of Data	Data Mean	Standard(1) Deviation
Al Interference :	83	59.7	1.26

QUALITY CONTROL GRAPHS FLUORIDE (UG/L AS F)

FROM: 04/01/88
TO: 20/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 70 UG/L AS F

***** IRON - SOIL (Xdi) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: FEEDI	Units	: % by weight Fe
Work Station Code	: DOMETDI	Unit Code	: 070826
Method Code	: 301AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.5 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried, disaggregated, ground and sieved to <150um.

ANALYTICAL PROCEDURE:

Iron is extracted from a 0.25 g soil sample using sodium citrate, sodium bicarbonate and sodium dithionite at 80°C (procedure is repeated twice). The sample is washed twice and its washings and extracts are combined and diluted to 50 mL with deionized water. The final solution is analyzed by AAS at 248.3 nm with an air-acetylene flame.
Approximate absorbance: 0.3 at the full scale level
N.B. Aluminum is determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples (run occasionally).
Drift : BBL plus 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/06/86 -Varian AA1275 replaced Perkin Elmer 403

NOTES:

Values for recoveries are unknown - average value used.

IRON - SOIL (Xdi)
QUALITY CONTROL DATA FROM 07/01/88 TO 06/12/88

Lab: Dorset Soils

Analytical Range: - to 2.00 % as Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	35	1.50	1.52	0.02	0.027
b :	35	0.50	0.50	0.00	0.017
a+b :	35	2.00	2.03	0.03	0.035
a-b :	35	1.00	1.02	0.02	0.029

s.d.(AB): SW(within run): 0.021 S(between runs): 0.023 S/Sw: 1.10

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.85 to 2.15 for A+B
0.90 to 1.10 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	34	1.19	1.16	0.045
r2 :	35	1.06	1.09	0.051
r3 :	35	0.88	0.91	0.052

DUPLICATES:

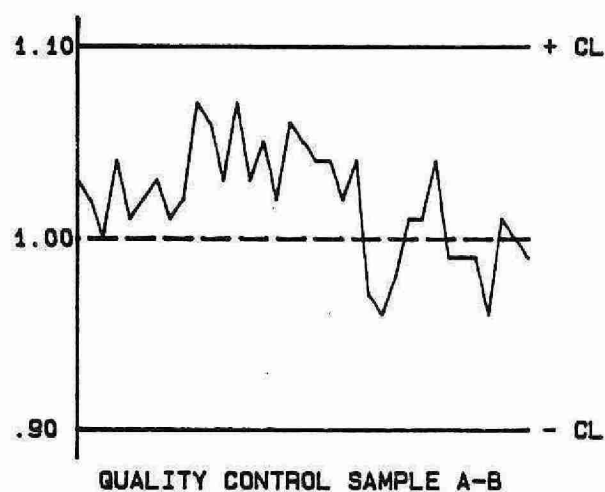
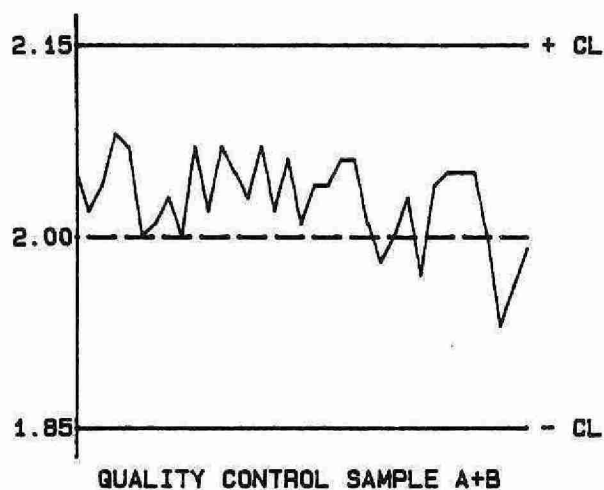
	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	26	0.00 - 0.40	0.016	6.2
	35	0.40 - 1.00	0.025	3.8
	34	1.00 - 2.00	0.044	3.1
	95	Overall	0.032	N/A

OTHER CHECKS:

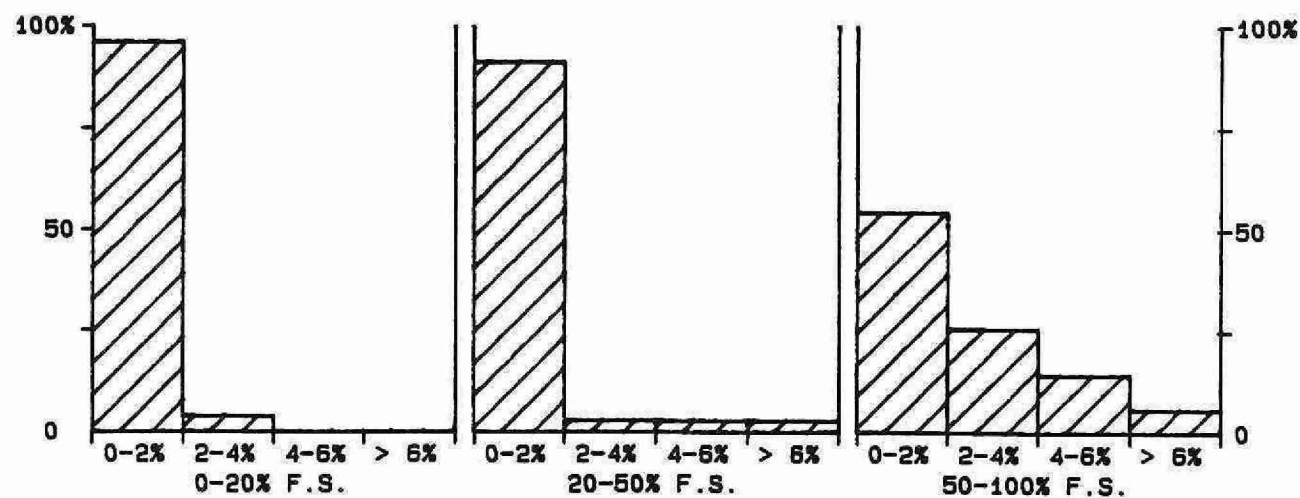
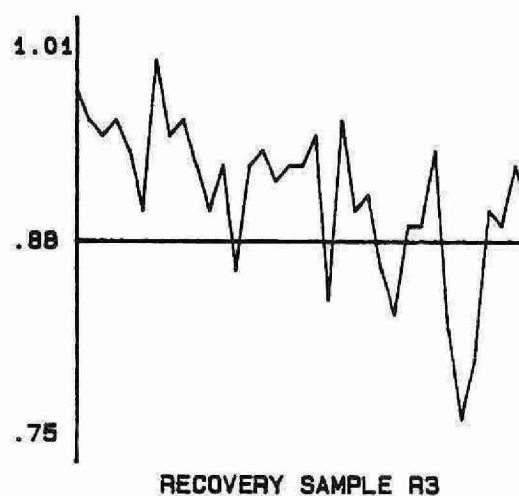
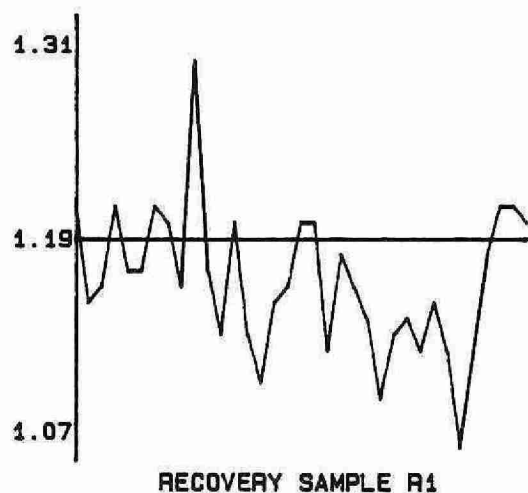
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	35	0.00	0.000

QUALITY CONTROL GRAPHS IRON - SOIL (XDI) (% AS FE)

FROM: 07/01/88
TO: 06/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-142-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 % AS FE

***** IRON - SOIL (Xpy) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: FEEPY	Units	: % by weight Fe
Work Station Code	: DOMETALX	Unit Code	: 070826
Method Code	: 703AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.6 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to < 2mm.

ANALYTICAL PROCEDURE:

A 0.300 g quantity of sample plus 30 mL of 0.1 M sodium pyrophosphate is agitated overnight in a centrifuge tube. Samples are centrifuged at 20,000 rpm for 15 minutes and the supernatant is analyzed by AAS at 248.3 nm with an air-acetylene flame.
Approximate absorbance: 0.3 at the full scale level
N.B. Aluminum and manganese may be determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples (run occasionally).
Drift : BBL plus 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/06/86 -Varian AA1275 replaced Perkin Elmer 403

NOTES:

Values for recoveries are unknown - average value used.

IRON-SOIL(Xpy)
QUALITY CONTROL DATA FROM 26/02/88 TO 25/09/88

Lab: Dorset Soils

Analytical Range: - to 1.00 % as Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	26	0.75	0.75	-0.00	0.019
b :	26	0.25	0.25	0.00	0.010
a+b :	26	1.00	1.00	0.00	0.021
a-b :	26	0.50	0.50	-0.00	0.021

s.d.(AB): Sw(within run): 0.015 S(between runs): 0.015 S/Sw: 1.02

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.92 to 1.07 for A+B
0.45 to 0.55 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	29	0.58	0.57	0.028
r2 :	30	0.23	0.22	0.019
r3 :	30	0.72	0.71	0.038

DUPLICATES:

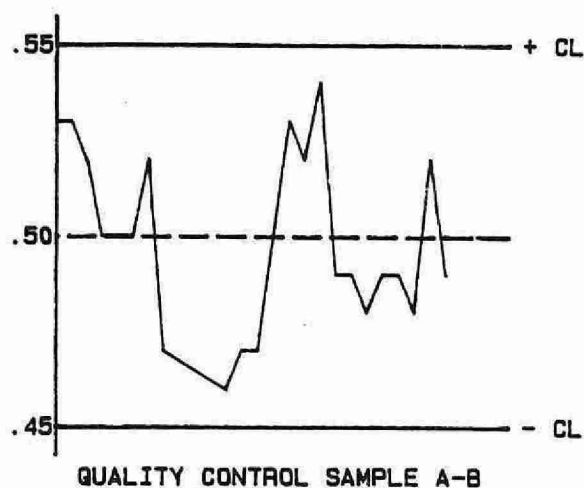
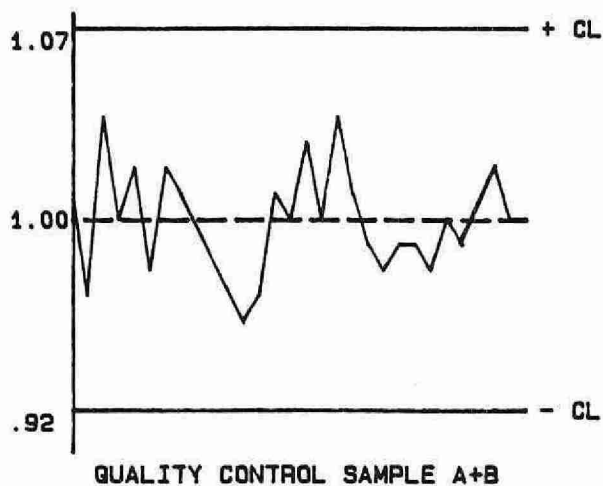
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
41	0.00 - 0.20	0.005	4.9
19	0.20 - 0.50	0.015	4.7
22	0.50 - 1.00	0.027	4.0
82	Overall	0.016	N/A

OTHER CHECKS:

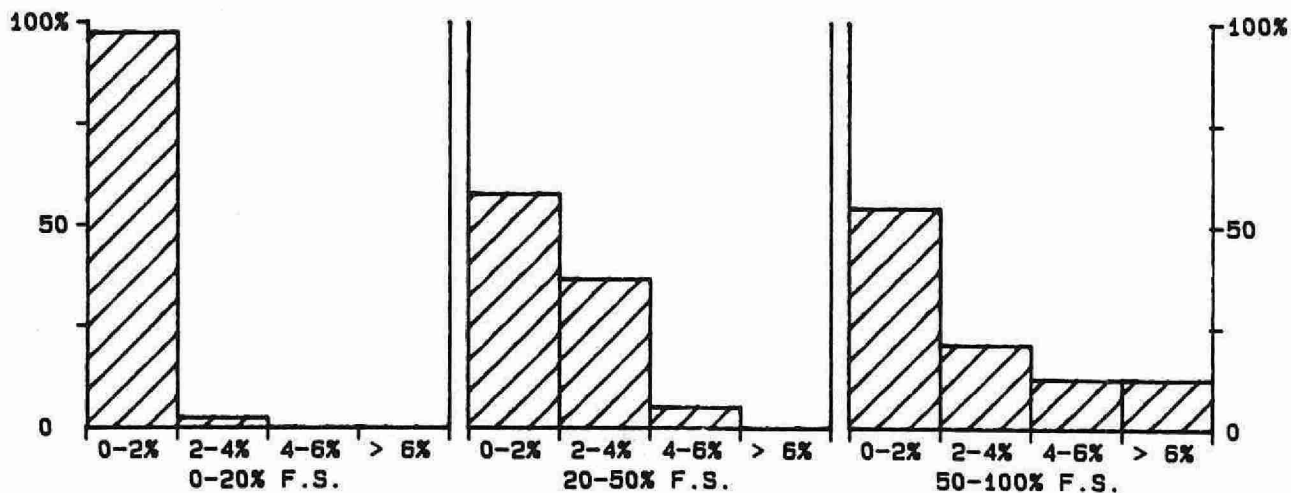
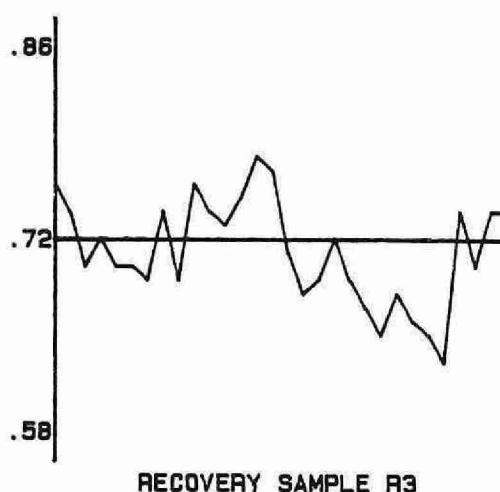
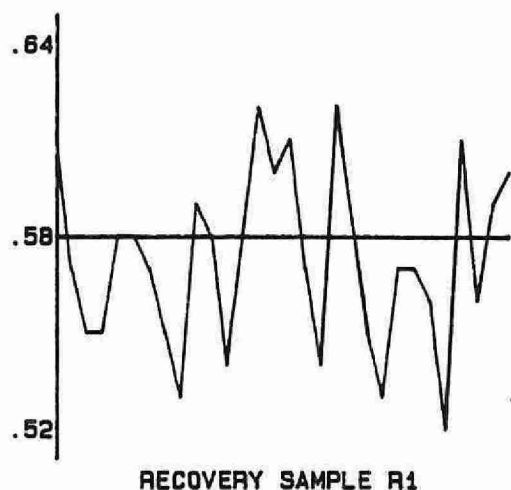
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	30	0.00	0.000

QUALITY CONTROL GRAPHS IRON-SOIL (XPY) (% AS FE)

FROM: 26/02/88
TO: 25/09/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



***** TOTAL LEAD - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	PBUT	Units	: ug/g as Pb
Work Station Code	: DOHMTE	Unit Code	: 073882
Method Code	: 551AA1	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 1 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried and ground to <150 um.

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Pb by AAS at 217.0 nm using an air-acetylene flame. Approximate absorbance: 0.1 at the full scale value. Copper, nickel and zinc are also determined on the extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types,
2 method blanks.
Drift : BBL + 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/01/83 -Hot block temperature increased from 160°C to 175°C
06/01/86 -Samples analyzed on Varian AAS1275 (replacing Perkin Elmer 5000)

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal.
Values for recoveries are unknown - average value used.

TOTAL LEAD - SOIL
QUALITY CONTROL DATA FROM 14/03/88 TO 15/11/88

Lab: Dorset Soils

Analytical Range: - to 50.0 ug/g as Pb

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	29	39.0	39.5	0.5	2.14
b :	29	16.5	17.2	0.7	2.16
a+b :	29	55.5	56.7	1.2	3.50
a-b :	29	22.5	22.3	-0.2	2.49

s.d.(AB): Sw(within run): 1.76 S(between runs): 2.15 S/Sw: 1.22

On any given day the calibration is accepted if the values obtained lie within the ranges:

40.5 to 70.5 for A+B
 12.5 to 32.5 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	29	11.0	11.7	2.10
r2 :	29	20.0	22.0	2.12
r3 :	29	28.0	29.5	2.01

DUPLICATES:

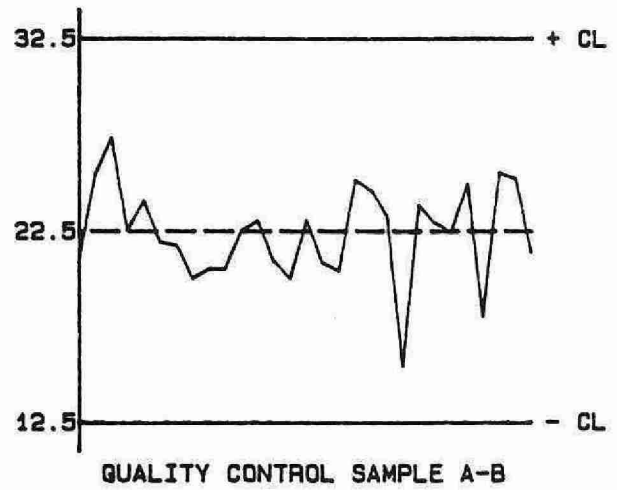
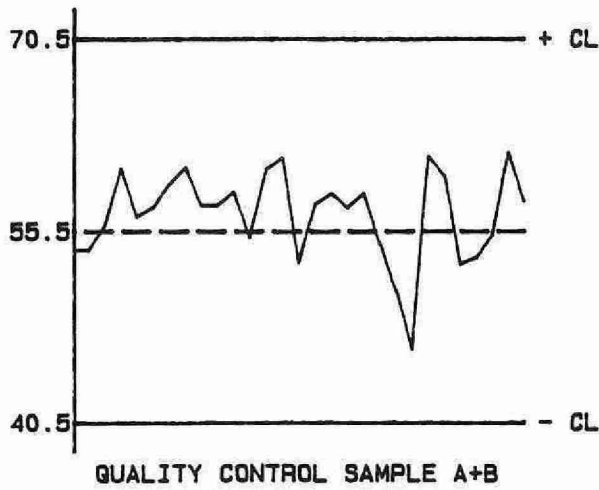
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
26	0.0 - 12.5	1.53	19.8
36	12.5 - 25.0	2.10	12.0
25	25.0 - 50.0	2.44	7.0
87	Overall	2.06	N/A

OTHER CHECKS:

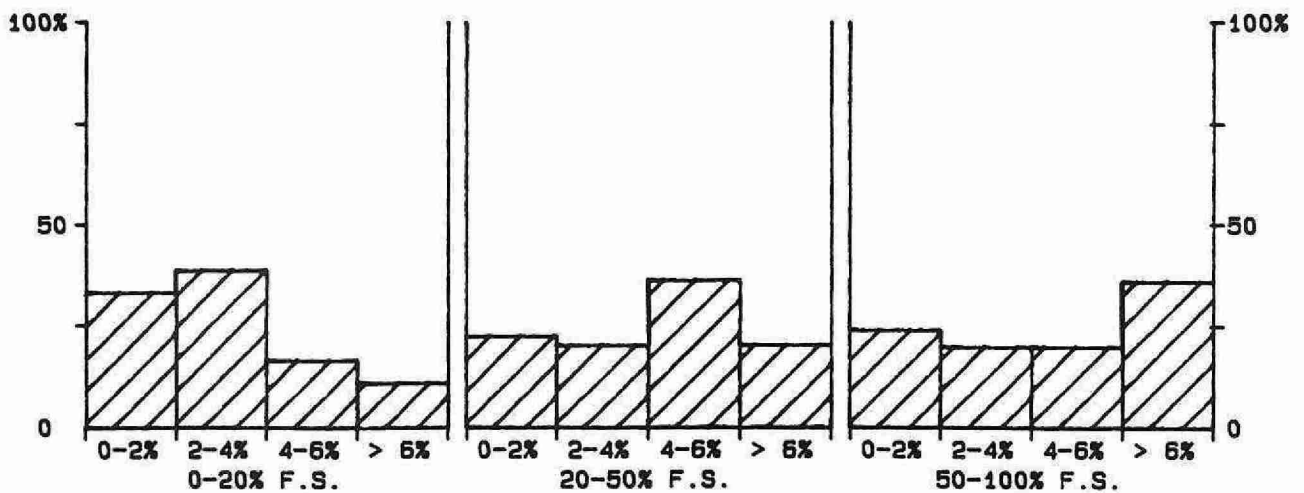
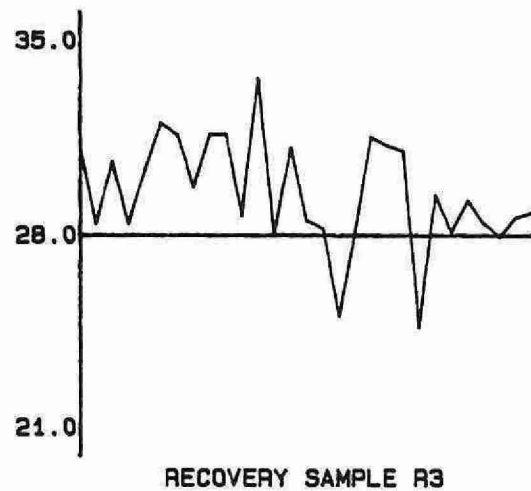
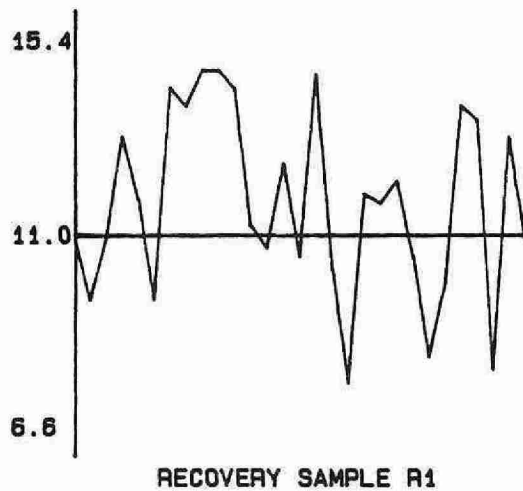
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	29	1.0	1.83

QUALITY CONTROL GRAPHS TOTAL LEAD - SOIL (UG/G AS PB)

FROM: 14/03/88
TO: 15/11/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



***** LEAD *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/03/86
LIS Test Name Code	: PBUT	Units	: ug/L as Pb
Work Station Code	: DOASV	Unit Code	: 063882
Method Code	: 001PP2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required	: 100 mL
Container	: 500 mL, acid washed Telfon container, bagged in a a clean room

ANALYTICAL PROCEDURE:

Samples are acidified to 0.1% using Seastar nitric acid in a clean room. Oxygen is removed by nitrogen gas and samples are analyzed using anodic stripping voltammetry on a EG + G ROTEL glassy carbon electrode. Change in current when lead is stripped from mercury drop is proportional to concentration.

INSTRUMENTATION:

EG & G (Princeton Applied Research) Model 384 Analyzer with ROTEL Rotating Glassy Carbon Electrode.

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 0.3	T value: 1.5
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CALIBRATION:

BL plus 2 standards daily

CONTROLS:

Calibration	: BL plus 2 standards, e.g. QCA + EPA standard.
Duplicate	: End of every run (approximately every 8 samples)

TOTAL LEAD
QUALITY CONTROL DATA FROM 12/01/88 TO 20/12/88

Lab: Dorset

Analytical Range: - to 2.000 ug/l as Pb

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	99	0.400	0.479	0.079	0.1522
b :	99	0.240	0.202	-0.038	0.0493
a+b :	99	0.640	0.681	0.041	0.1807
a-b :	99	0.160	0.277	0.117	0.1361

s.d.(AB): Sw(within run): 0.0962 S(between runs): 0.1131 S/Sw: 1.18

On any given day the calibration is accepted if the values obtained lie within the ranges:

-0.260 to 1.540 for A+B
-0.440 to 0.760 for A-B

DUPLICATES:

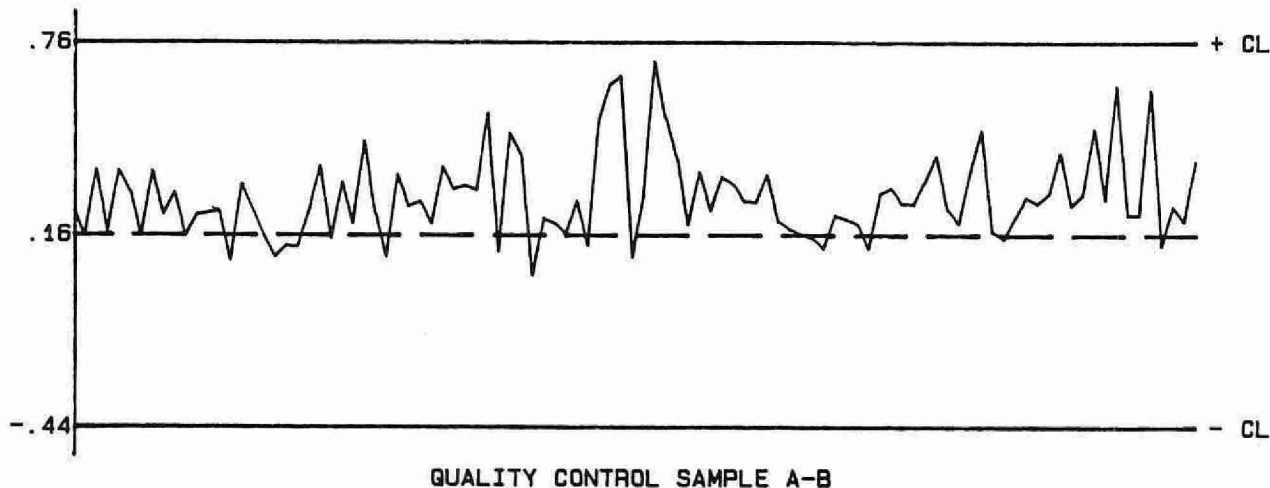
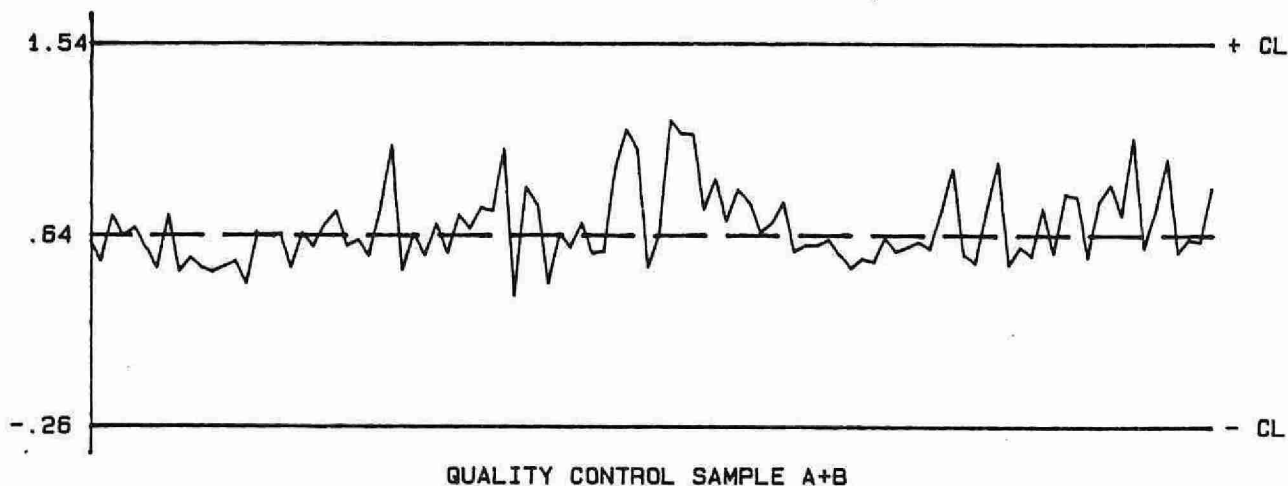
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
5	0.000 - 0.100	0.0063	9.4
6	0.100 - 0.200	0.0204	14.1
12	0.200 - 0.500	0.0562	17.0
15	0.500 - 1.000	0.1472	20.7
10	1.000 - 2.000	0.8141	59.1
48	Overall	0.3817	N/A

OTHER CHECKS:

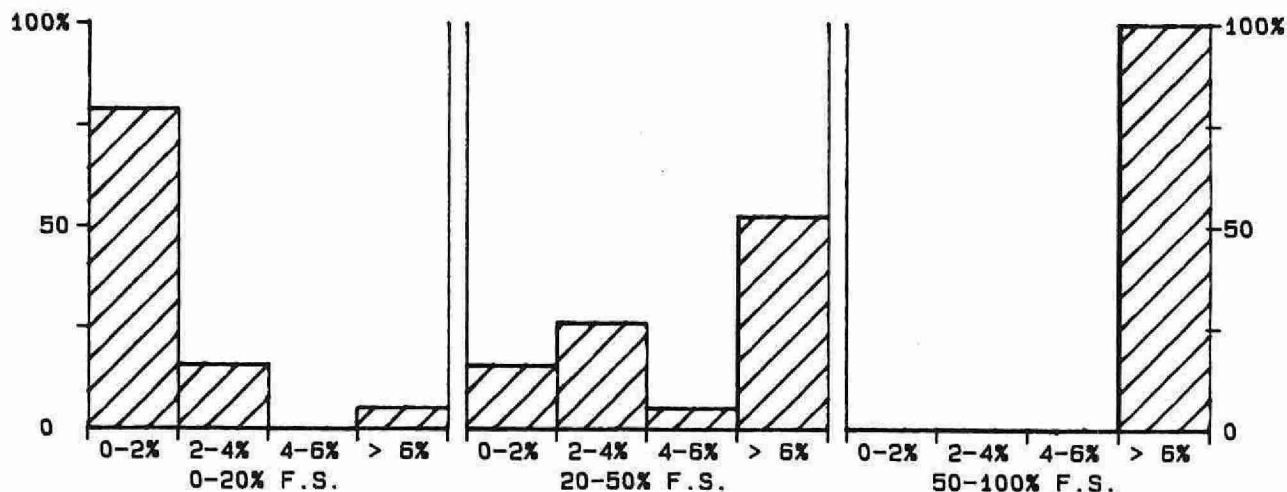
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	99	0.000	0.0004

QUALITY CONTROL GRAPHS TOTAL LEAD (DOASV) (UG/L AS PB)

FROM: 12/01/88
TO: 20/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-151-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 UG/L AS PB

***** MAGNESIUM *****

IDENTIFICATION:

Laboratory : Atomic Absorption Method Introduced: 18/05/79
Lis Test Name Code : MGUR Units : mg/L as Mg
Work Station Code : PRAA Unit Code : 064812
Method Code : 001CA1 Supervisor : F. Tomassini
Sample Type/Matrix : Precipitation, Throughfall, Filter extracts

SAMPLING:

Quantity Required : 5 mL
Container : Pet-500 mL Jars

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm with an air-acetylene flame.
Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS;

07/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of Commodore PET for data capture and data reduction. Sample required reduced to 5 mL.

MAGNESIUM - PRAA
QUALITY CONTROL DATA FROM 12/01/88 TO 29/12/88

Lab: Atomic Absorption

Analytical Range: - to 0.500 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	72	0.300	0.303	0.003	0.0036
b :	72	0.050	0.054	0.004	0.0032
a+b :	72	0.350	0.357	0.007	0.0049
a-b :	72	0.250	0.249	-0.001	0.0047

s.d.(AB): Sw(within run): 0.0033 S(between runs): 0.0034 S/Sw: 1.02

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.327 to 0.372 for A+B
0.235 to 0.265 for A-B

DUPLICATES:

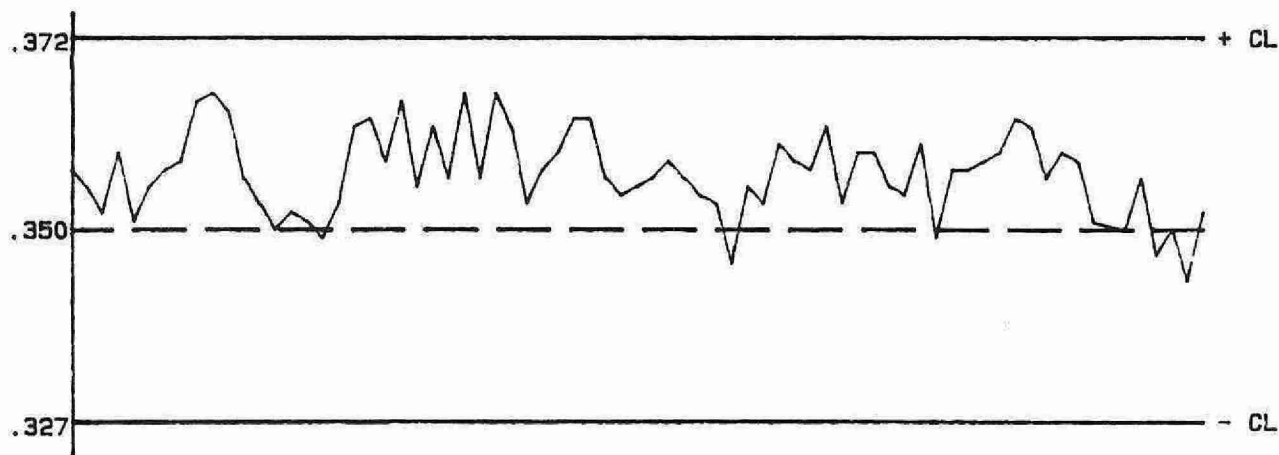
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
114	0.000 - 0.050	0.0057	27.5
31	0.050 - 0.100	0.0053	8.1
21	0.100 - 0.200	0.0084	6.3
10	0.200 - 0.300	0.0074	2.9
6	0.300 - 0.500	0.0028	0.6
182	Overall	0.0060	N/A

OTHER CHECKS:

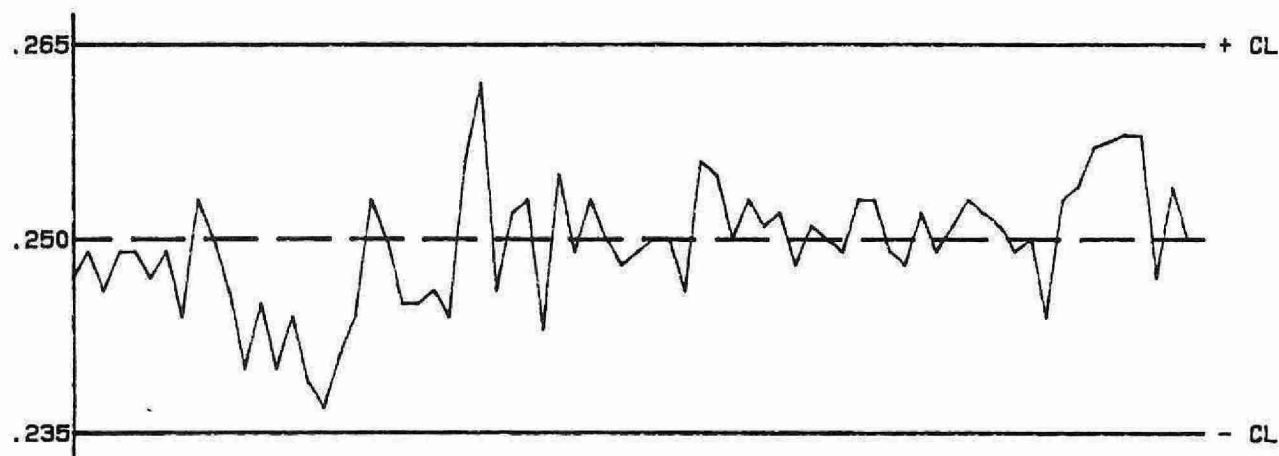
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	30	0.362	0.0766

QUALITY CONTROL GRAPHS MAGNESIUM - PRAA (MG/L AS MG)

FROM: 12/01/88
TO: 29/12/88

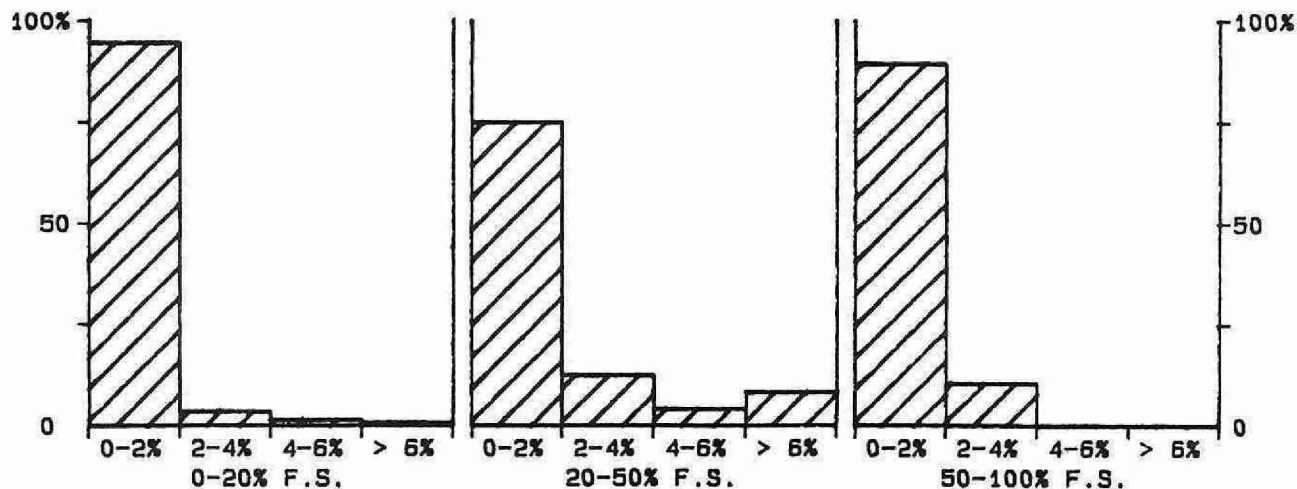


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): .5 MG/L AS MG

***** MAGNESIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced:	20/07/88
Lis Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: PRAAS	Unit Code	: 064812
Method Code	: 001CA1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required : 5 mL
Container : Pet Jars only

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm with an air-acetylene flame.
Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS;

07/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of Commodore PET for data capture and data reduction. Sample required reduced to 5 mL.

MAGNESIUM-PRAAS
QUALITY CONTROL DATA FROM 20/07/88 TO 30/12/88

Lab: Atomic Absorption

Analytical Range: - to 2.000 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	29	1.60	1.61	0.01	0.014
b :	29	0.40	0.41	0.01	0.005
a+b :	29	2.00	2.02	0.02	0.016
a-b :	29	1.20	1.20	0.00	0.014
c :	29	0.40	0.41	0.01	0.005
d :	29	0.10	0.10	0.00	0.004
c+d :	29	0.50	0.51	0.01	0.008
c-d :	29	0.30	0.31	0.01	0.006

s.d.(AB): Sw(within run): 0.010 S(between runs): 0.011 S/Sw: 1.06
s.d.(CD): Sw(within run): 0.004 S(between runs): 0.005 S/Sw: 1.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.91 to 2.09 for A+B
1.14 to 1.26 for A-B
0.41 to 0.59 for C+D
0.24 to 0.36 for C-D

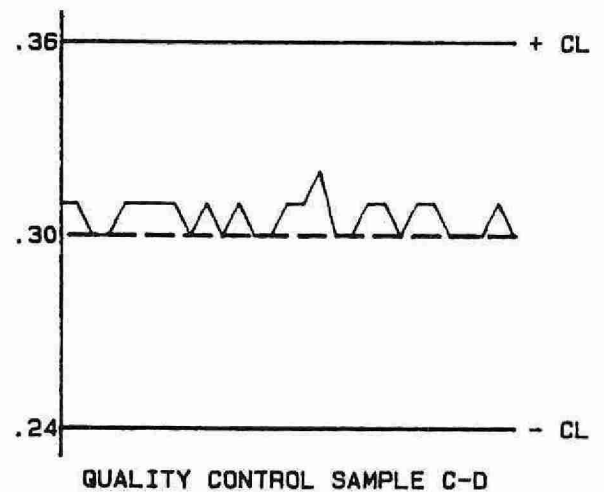
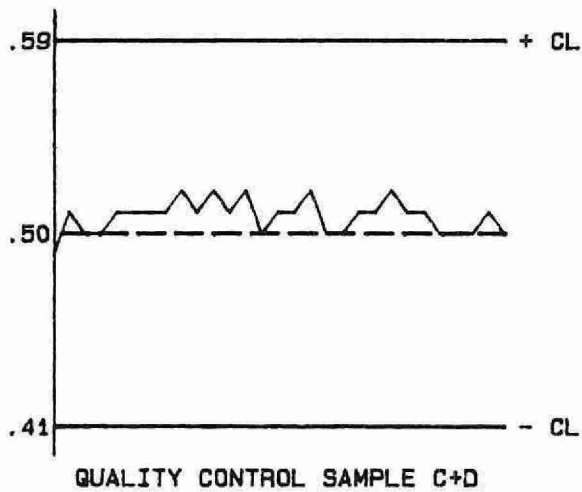
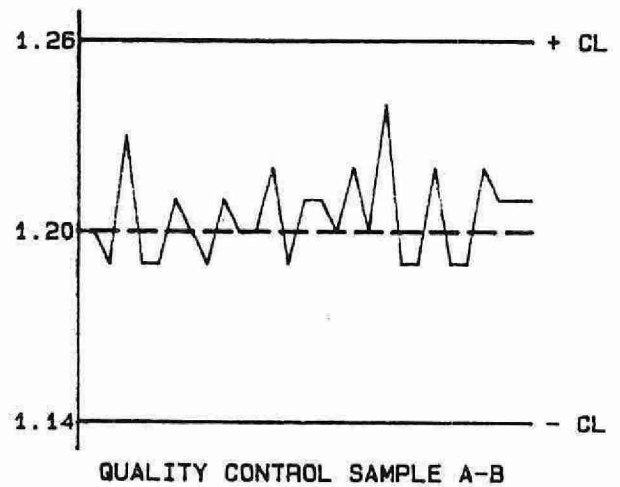
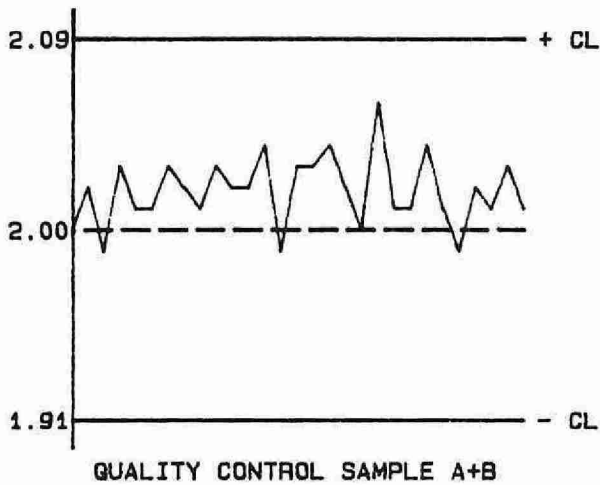
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	0	0.000 - 0.200	N/A	N/A
	2	0.200 - 0.500	0.0158	4.4
	40	0.500 - 1.000	0.0089	1.2
	13	1.000 - 1.500	0.0179	1.3
	17	1.500 - 2.000	0.0135	0.7
	72	Overall	0.0123	N/A

OTHER CHECKS:

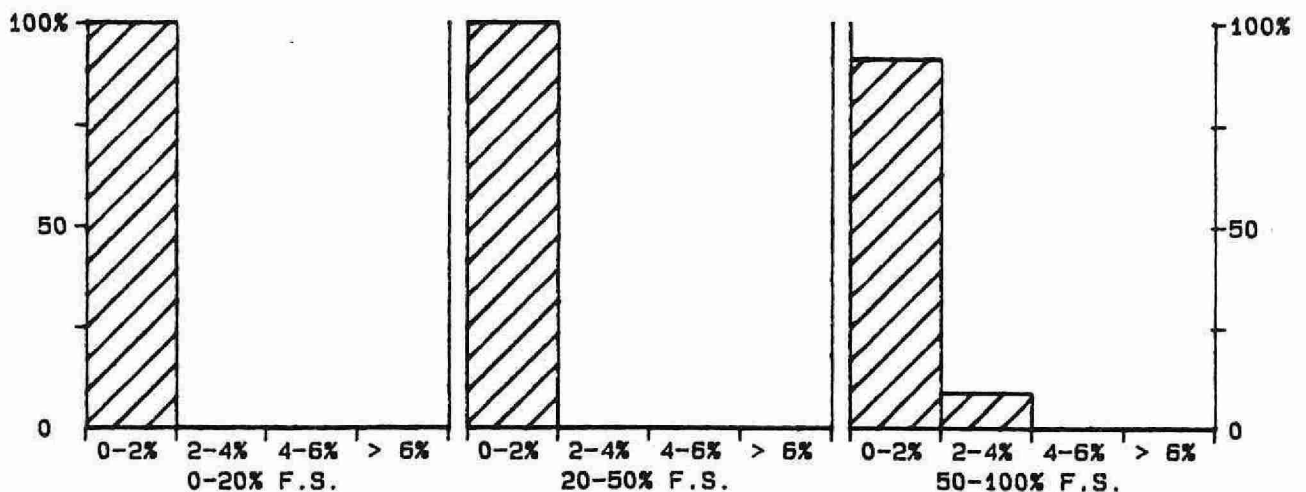
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	27	1.167	0.0615
Long Term Blank :	29	0.00	0.000

QUALITY CONTROL GRAPHS MAGNESIUM-PRAAS (MG/L AS MG)

FROM: 20/07/88
TO: 30/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



***** MAGNESIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: RMAAS	Unit Code	: 064812
Method Code	: 0901A1	Supervisor	: F. Tommassini
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required : 6 mL
Container : Glass or Pet 500 ml Jars

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm using an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.19 at the full scale level

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : LTBL plus 3 standards and LTB e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples.

MODIFICATIONS:

01/12/81 -Calibration range became 5.00 mg/L full scale; second analytical range was dropped.
01/03/84 -Analytical range (RMCAMGH) was added; full scale: 1.00 mg/L. This range is currently restricted to special programs.
01/09/84 -Analytical range (RMCAMGH) was increased from 5.00 to 10.0 mg/L full scale. Calibration technique was no longer determined simultaneously.
25/09/85 -Calibration range became 7.0 mg/L full scale; second analytical range was dropped. Commodore PET microcomputer controlled system with sample flow injection introduced.
1985 -Three analytical ranges were used during 1985: 1.00, 7.00, and 10.0 mg/L as Mg full scale.
06/04/87 -Changed full scale to 10 mg/L as Mg
 Number of cal.standards changed from 10 to 11
 Number of QC standards changed from 2 to 3 plus one LTB

MAGNESIUM-RMAAS
QUALITY CONTROL DATA FROM 04/01/88 TO 29/12/88

Lab: Atomic Absorption

Analytical Range: - to 10.00 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	115	8.00	7.95	-0.05	0.089
b :	115	2.00	2.00	-0.00	0.031
a+b :	115	10.00	9.95	-0.05	0.104
a-b :	115	6.00	5.95	-0.05	0.083
c :	115	2.00	2.00	-0.00	0.032
d :	115	0.500	0.504	0.004	0.0239
c+d :	115	2.500	2.500	0.000	0.0435
c-d :	115	1.500	1.492	-0.008	0.0355

s.d.(AB): SW(within run): 0.059 S(between runs): 0.067 S/Sw: 1.14
s.d.(CD): SW(within run): 0.025 S(between runs): 0.028 S/Sw: 1.13

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.47 to 10.53 for A+B
5.95 to 6.35 for A-B
2.050 to 2.950 for C+D
1.200 to 1.800 for C-D

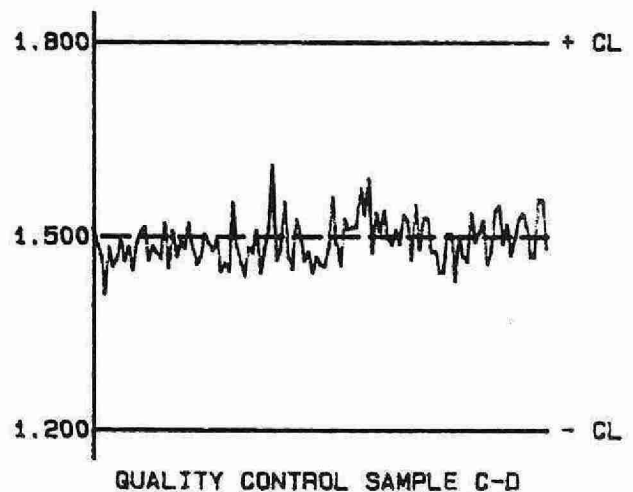
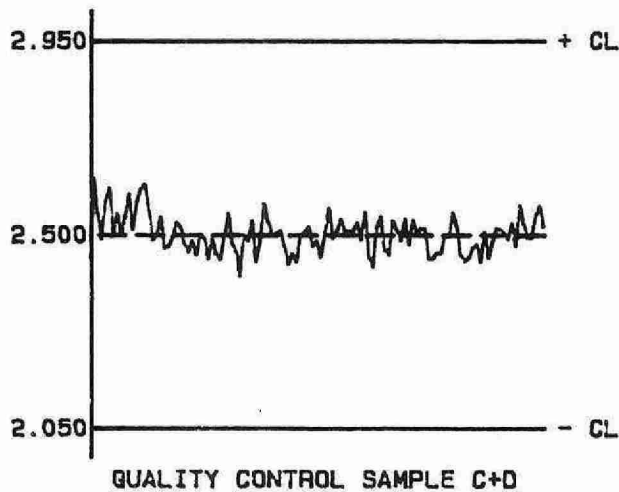
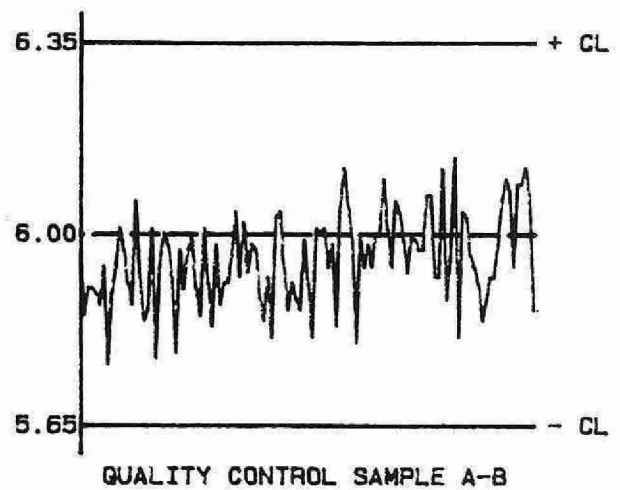
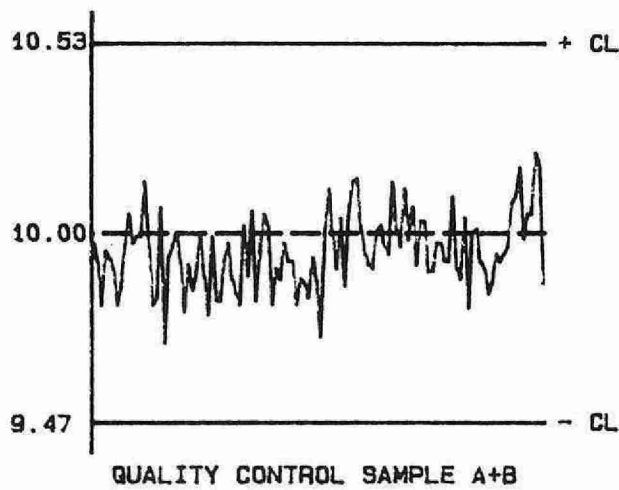
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	86	0.00 - 1.00	0.054	8.1
	52	1.00 - 2.00	0.072	5.0
	51	2.00 - 4.00	0.101	3.3
	35	4.00 - 7.00	0.098	1.9
	28	7.00 - 10.00	0.292	3.4
	252	Overall	0.122	N/A

OTHER CHECKS:

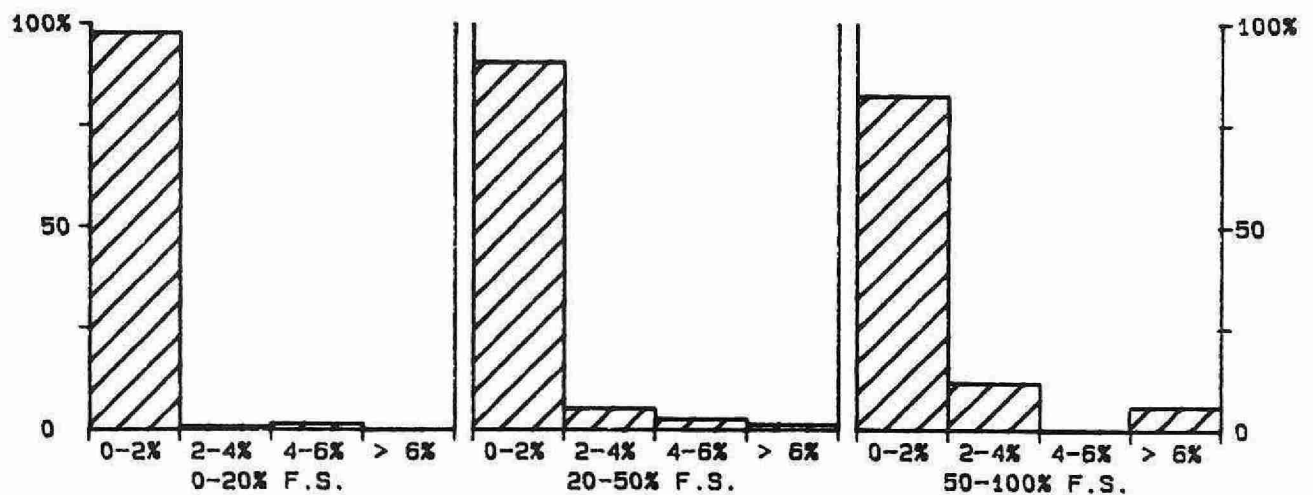
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	108	1.165	0.0583
Long Term Blank :	113	-0.00	0.017

QUALITY CONTROL GRAPHS MAGNESIUM-RMAAS (MG/L AS MG)

FROM: 04/01/88
TO: 29/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-160-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10 MG/L AS MG

***** MAGNESIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced:	08/04/86
Lis Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: WAAS	Unit Code	: 064812
Method Code	: 001CA1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial wastes		

SAMPLING:

Quantity Required : 6 mL
Container : Glass or Pet 500 ml Jars

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm using an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.187 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 I value: 0.5

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : LTBL plus 3 standards plus LTB e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

01/07/82 -The method introduced on this date differ slightly from Method B for magnesium in HAMES in that full scale was 20.0 mg/L; concentrations of QC standards were adjusted accordingly.
08/04/86 -All sample classes moved to WAAS workstation. Single analytical range changed from 80 to 35 mg/L as Mg. Number of calibration standards increased from 2 to 10. Concentration of QC solutions adjusted accordingly. Commodore PET microcomputer system control and data handling introduced with linear interpolation of calibration technique. Sample flow injection was introduced.
03/03/87 -Changed full scale to 50 mg/L as Mg
Number of cal.standards changed from 10 to 11
Number of QC standards changed from 2 to 3 plus LTB

MAGNESIUM-WAAS
QUALITY CONTROL DATA FROM 04/01/88 TO 23/12/88

Lab: Atomic Absorption

Analytical Range: - to 50.00 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	125	40.00	40.09	0.09	0.580
b :	125	10.00	10.11	0.11	0.208
a-b :	125	50.00	50.20	0.20	0.643
a-b :	125	30.00	29.98	-0.02	0.581
c :	125	10.00	10.11	0.11	0.208
d :	125	2.50	2.52	0.02	0.135
c+d :	125	12.50	12.63	0.13	0.258
c-d :	125	7.50	7.59	0.09	0.238

s.d.(AB): Sw(within run): 0.411 S(between runs): 0.436 S/Sw: 1.06
s.d.(CD): Sw(within run): 0.168 S(between runs): 0.175 S/Sw: 1.04

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.75 to 52.25 for A+B
29.50 to 31.50 for A-B
10.25 to 14.75 for C+D
6.00 to 9.00 for C-D

DUPLICATES:

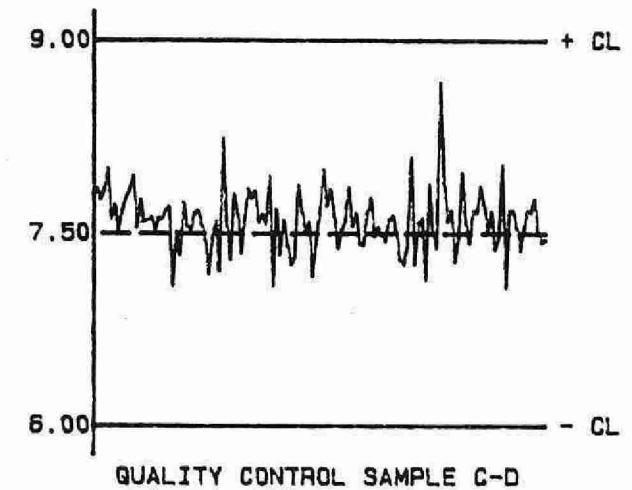
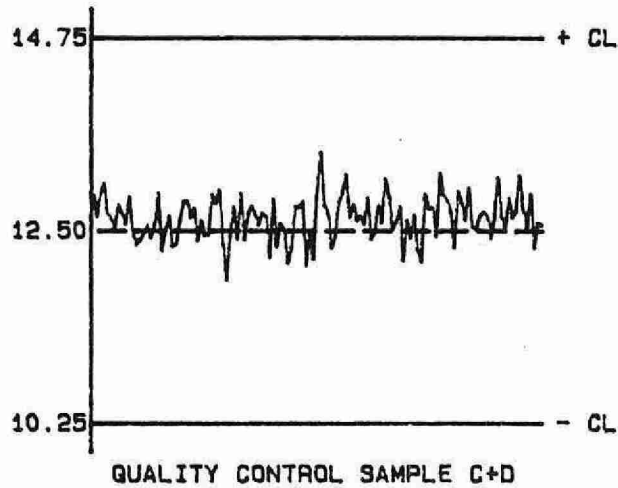
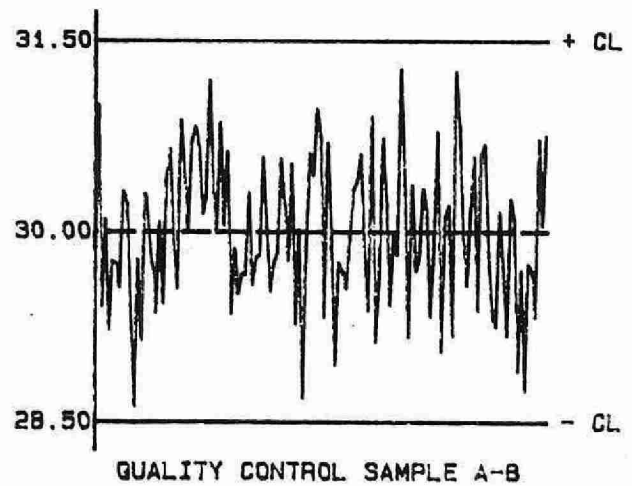
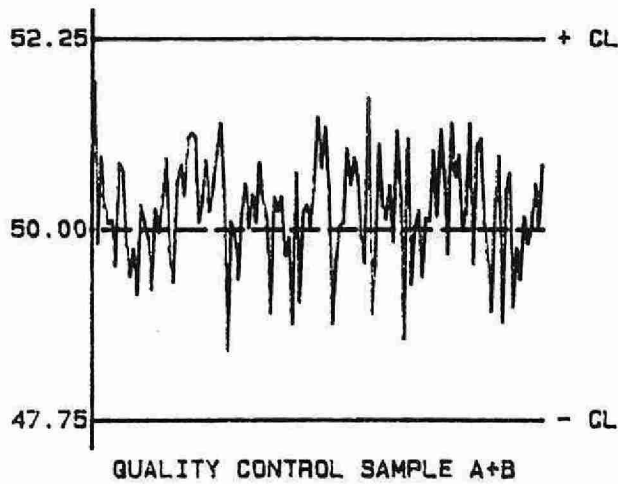
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
35	0.00 - 2.50	0.147	13.1
26	2.50 - 5.00	0.166	4.0
70	5.00 - 10.00	0.328	4.3
137	10.00 - 25.00	0.282	1.6
48	25.00 - 50.00	0.528	1.5
316	Overall	0.325	N/A

OTHER CHECKS:

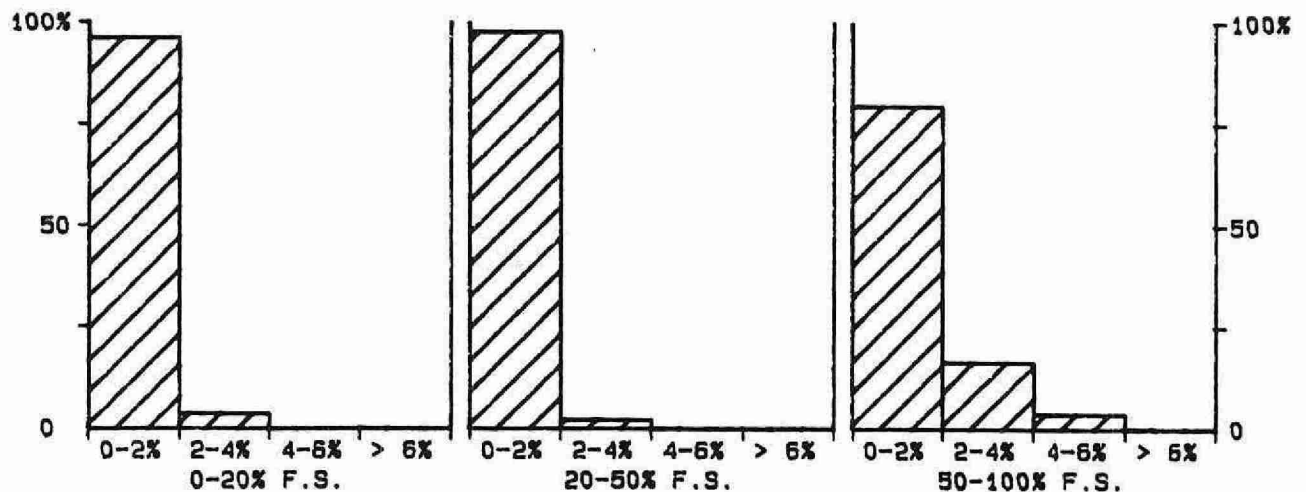
	Number of Data	Data Mean	Standard (1) Deviation
Absorbance :	116	1.216	0.0582
Long Term Blank :	123	-0.01	0.075

QUALITY CONTROL GRAPHS MAGNESIUM-WAAS (MG/L AS MG)

FROM: 04/01/88
TO: 29/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-163-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 50 MG/L AS MG

*** MAGNESIUM - SOIL (Xsc) ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: MGESC	Units	: meq/100 g
Work Station Code	: DOCAION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 6 g dry
Container : Glass jar

SAMPLE PREPARATION:

Samples are air dried,disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Mg by AAS at 285.2 nm with an air-acetylene flame.
Approximate absorbance: 0.3 at the full scale level.
Aluminum, calcium, and potassium are determined simultaneously.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples (run occasionally).
Drift : BBL plus 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/04/81 -three g sample used for all soil types (6 g previously used for sandy soils)
01/06/86 -Varian AA1275 replaced Perkin Elmer 403

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable A, Ca, Mg, and K.
Values for recoveries are unknown - average value used.

MAGNESIUM - SOIL (Xsc)
QUALITY CONTROL DATA FROM 06/01/88 TO 16/11/88

Lab: Dorset Soils

Analytical Range: - to 2.50 meq/100g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	29	1.88	1.88	0.01	0.035
b :	29	0.63	0.64	0.02	0.029
a+b :	29	2.50	2.53	0.03	0.053
a-b :	29	1.25	1.24	-0.01	0.037

s.d.(AB): Sw(within run): 0.026 S(between runs): 0.032 S/Sw: 1.23

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31 to 2.69 for A+B
1.13 to 1.37 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	17	0.05	0.06	0.013
r2 :	27	2.29	2.11	0.077
r3 :	27	0.29	0.30	0.023

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
62	0.00 - 0.50	0.015	13.2
14	0.50 - 1.25	0.030	3.8
10	1.25 - 2.50	0.071	3.6
86	Overall	0.030	N/A

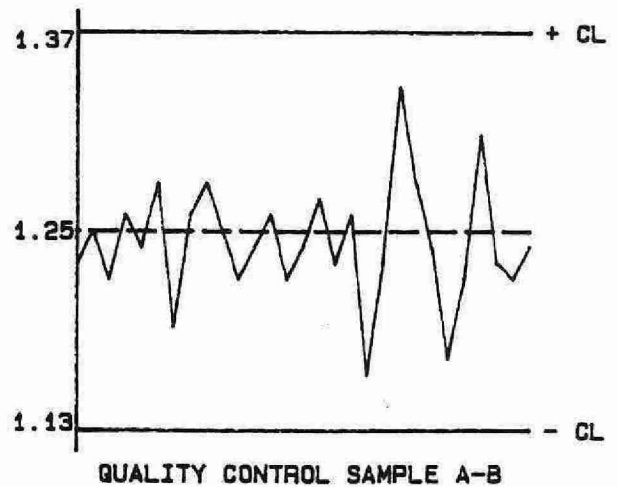
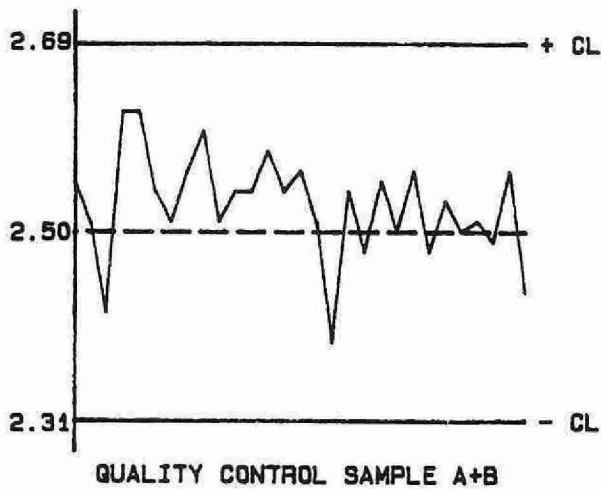
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	29	0.00	0.004

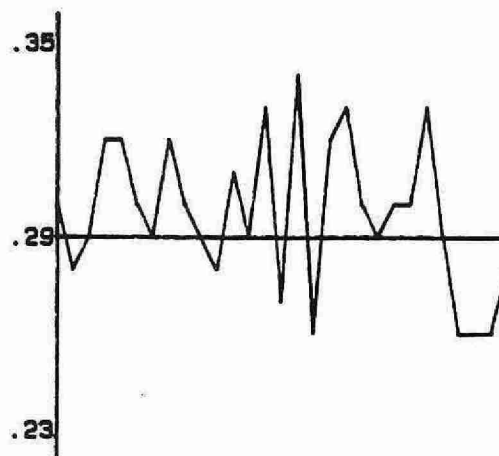
QUALITY CONTROL GRAPHS MAGNESIUM - SOIL (XSC) (MEQ/100G)

FROM: 06/01/88

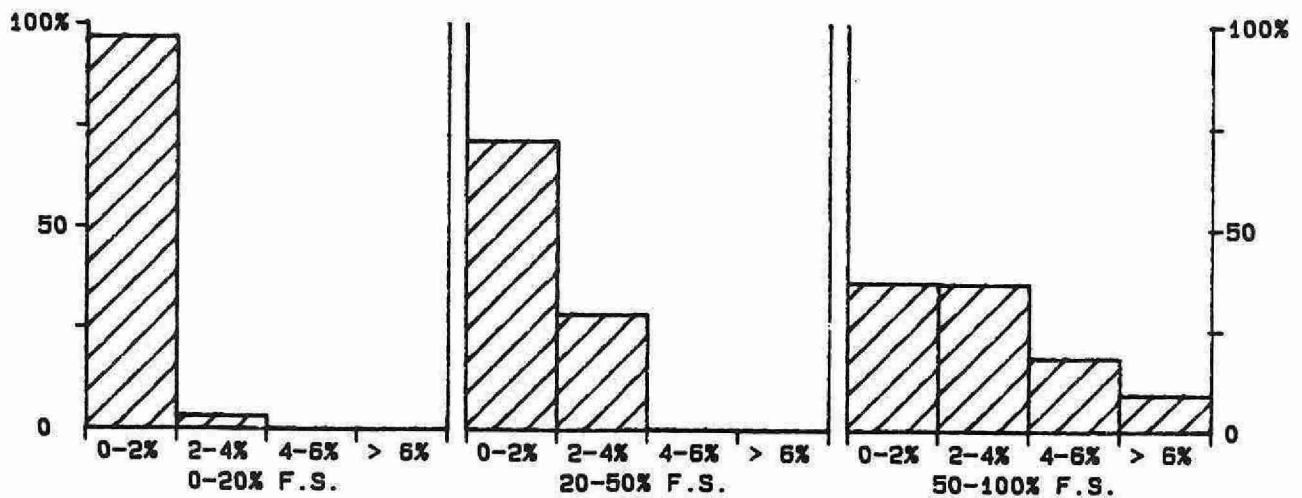
TO: 16/11/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



RECOVERY SAMPLE R3



-166-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2.5 MEQ/100G

***** TOTAL NICKEL - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: NIUT	Units	: ug/g as Ni
Work Station Code	: DOHMTE	Unit Code	: 073828
Method Code	: 551AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried and ground to <150 um.

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Ni by AAS at 232.0 nm using an air-acetylene flame. Approximate absorbance: 0.2 at the full scale value.
Copper, lead and zinc are also determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types,
2 method blanks.
Drift :BBL plus 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/01/83 -Hot block temperature increased from 160°C to 175°C
06/01/86 -Samples analyzed on Varian AAS1275 (replacing Perkin Elmer 5000)

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal.
Values for recoveries are unknown - average value used.

TOTAL NICKEL - SOIL
QUALITY CONTROL DATA FROM 14/03/88 TO 15/11/88

Lab: Dorset Soils

Analytical Range: - to 50.0 ug/g as Ni

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	29	36.3	36.9	0.6	1.54
b :	29	13.5	13.8	0.3	1.65
a+b :	29	49.8	50.7	0.9	2.06
a-b :	29	22.8	23.1	0.3	2.43

s.d.(AB): Sw(within run): 1.72 S(between runs): 1.60 S/Sw: 0.93

On any given day the calibration is accepted if the values obtained lie within the ranges:

42.3 to 57.3 for A+B
 17.8 to 27.8 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	29	9.5	9.6	1.89
r2 :	29	28.5	29.2	1.96
r3 :	28	6.8	7.2	1.64

DUPLICATES:

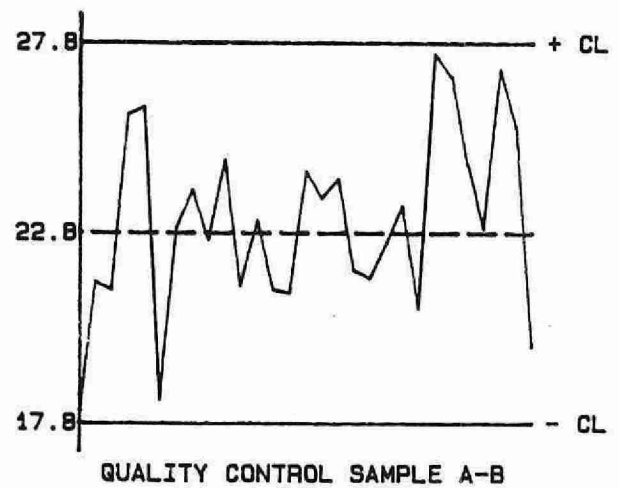
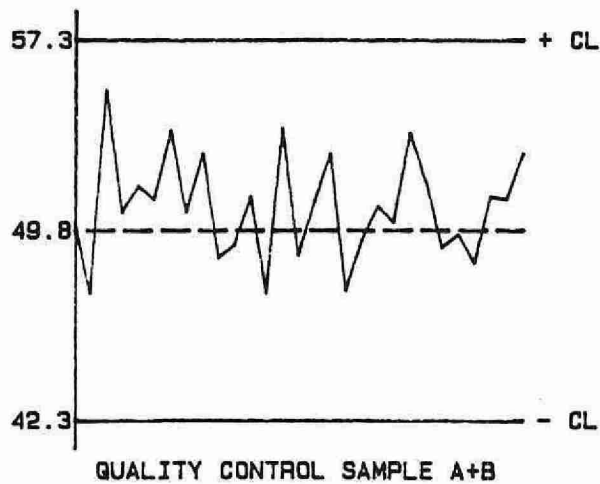
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
41	0.0 - 12.5	1.28	18.6
34	12.5 - 25.0	1.42	8.6
12	25.0 - 50.0	1.39	3.9
87	Overall	1.35	N/A

OTHER CHECKS:

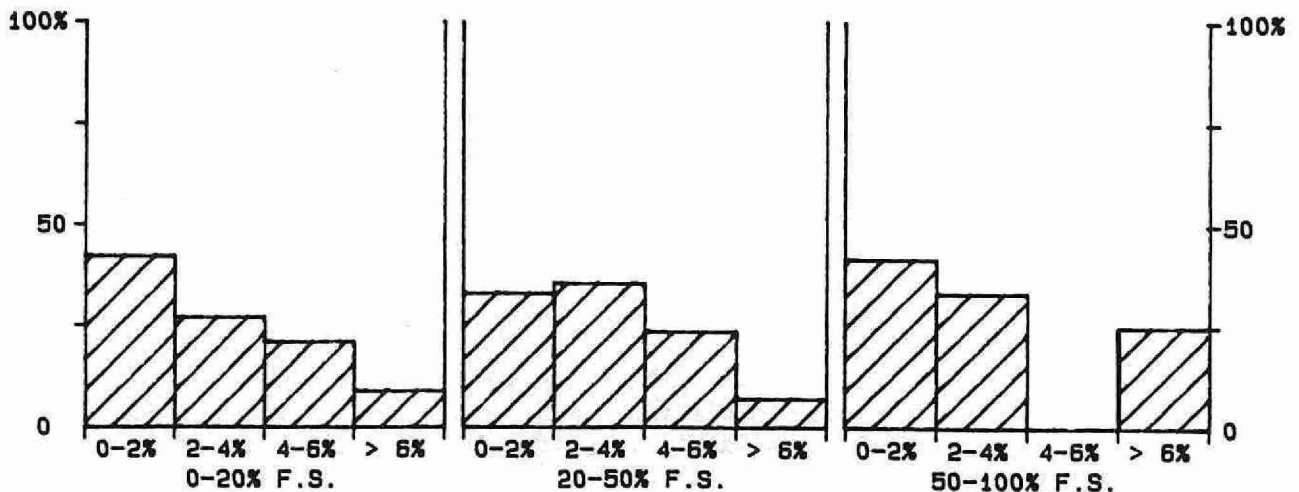
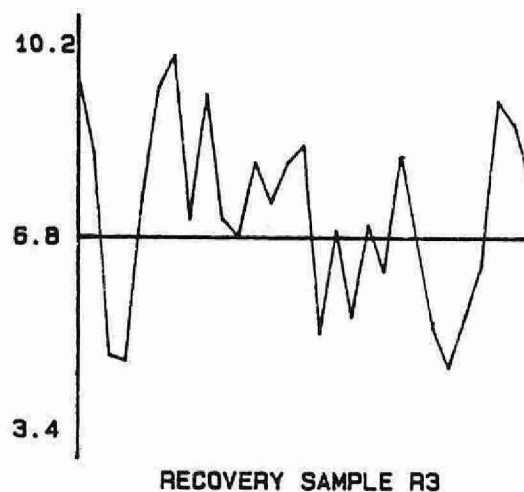
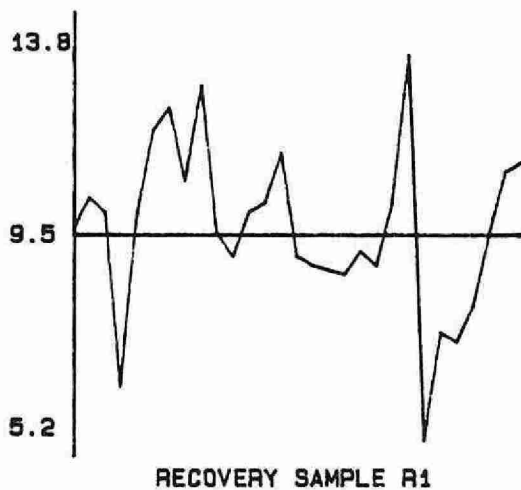
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	29	0.4	0.84

QUALITY CONTROL GRAPHS TOTAL NICKEL - SOIL (UG/G AS NI)

FROM: 14/03/88
TO: 15/11/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-169-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 50 UG/G AS NI

***** NITROGEN - AMMONIA PLUS AMMONIUM *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/84
LIS Test Name Code	: NNHTFR	Units	: ug/fltr as N
Work Station Code	: PRAM	Unit Code	: 361807
Method Code	: 004A11	Supervisor	: M. Rawlings
Sample Type/Matrix	: Dry deposition air filter extracts		

SAMPLING:

Quantity Required : 10 mL
Container : Polystyrene

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on an extract from a dry deposition air filter via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects. Ammonia plus ammonium for dry deposition air filter extracts is also determined at this workstation. Approximate absorbance: 0.7 at the full scale level. Ammonia plus ammonium for precipitation, throughfall, and stemflow samples is also determined at this workstation.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 630 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples, standard every 20 samples.

MODIFICATIONS:

01/06/88 -The PRNUT system was upgraded with full DCI (automated data capture and processing) capability. The analytical section of the workstation is the same for all three channels present; the differentiation between methods is made in software. The PRNUT workstation was retired, and re-opened under the PRAM name with a new configuration of channels combining the ammonia channels only from the PRAM, PRLOV, PRSEQ workstations. There is no data summary sheet for the workstation. However, the calibration and Q.C. solutions are the same as that for PRAM workstation with a multiplication factor of 25.

***** NITROGEN - AMMONIA PLUS AMMONIUM *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/84
LIS Test Name Code	: NNHTFR,NNHTUR	Units	: mg/L as N
Work Station Code	: PRAM	Unit Code	: 064807
Method Code	: 103CC3, 003CC3	Supervisor	: M. Rawlings
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 10 mL
Container	: Polystyrene

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects. Ammonia plus ammonium for dry deposition air filter extracts is also determined at this workstation. Approximate absorbance: 0.7 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 630 nm.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.002	T value: 0.01
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples, standard every 20 samples.

MODIFICATIONS:

01/06/88 -The PRNUT system was upgraded with full DCI (automated data capture and processing) capability. The analytical section of the workstation is the same for all three channels present; the differentiation between methods is made in software. The PRNUT workstation was retired, and re-opened under the PRAM name with a new configuration of channels combining the ammonia channels only from the PRNUT, PRLOV, PRSEQ workstations.

PRECIPITATION AMMONIA-PRAM
QUALITY CONTROL DATA FROM 23/06/88 TO 14/12/88

Lab: Colourimetry

Analytical Range: - to 5.000 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	38	4.00	4.03	0.03	0.032
b :	38	2.00	2.01	0.01	0.032
a+b :	38	6.00	6.04	0.04	0.052
a-b :	38	2.00	2.02	0.02	0.033
c :	37	2.00	2.01	0.01	0.024
d :	37	0.40	0.40	0.00	0.021
c+d :	37	2.40	2.42	0.02	0.035
c-d :	37	1.60	1.61	0.01	0.028

s.d.(AB): Sw(within run): 0.027 S(between runs): 0.032 S/Sw: 1.19
s.d.(CD): Sw(within run): 0.020 S(between runs): 0.023 S/Sw: 1.14

On any given day the calibration is accepted if the values obtained lie within the ranges:

5.25 to 6.75 for A+B
1.50 to 2.50 for A-B
2.10 to 2.70 for C+D
1.40 to 1.80 for C-D

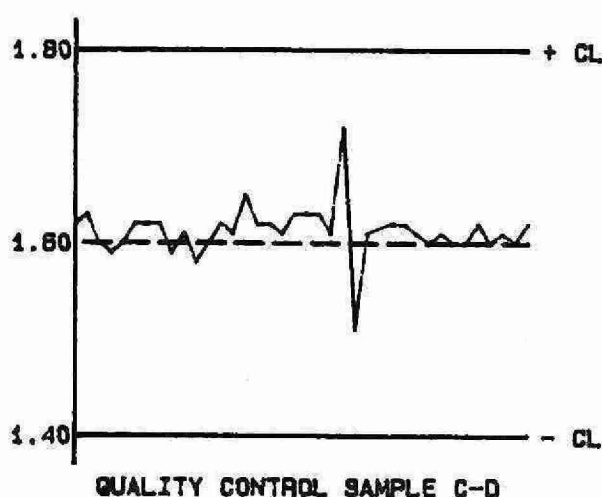
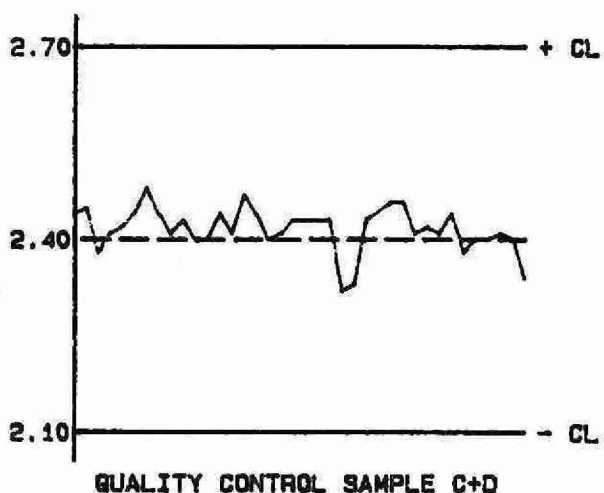
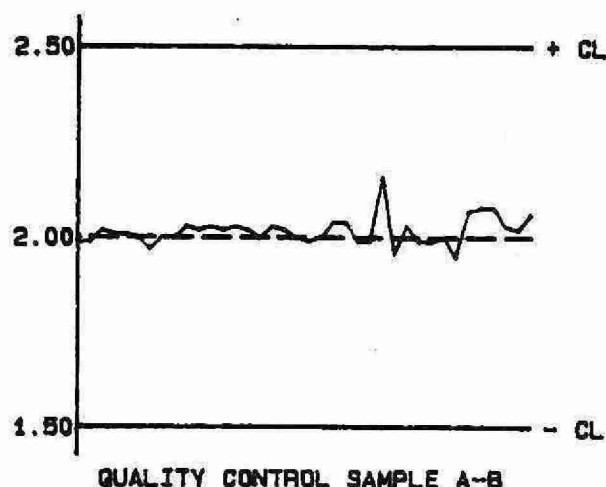
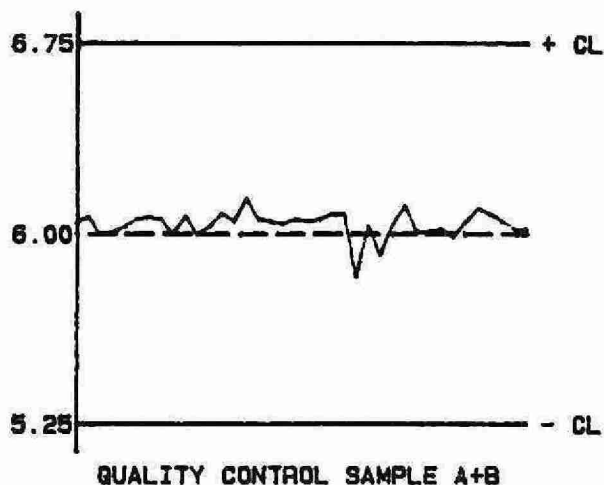
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	79	0.000 - 0.500	0.0232	12.3
	19	0.500 - 1.000	0.0260	3.8
	11	1.000 - 2.500	0.0607	4.0
	3	2.500 - 3.750	0.0091	0.3
	1	3.750 - 5.000	N/A	N/A
	113	Overall	0.0294	N/A

OTHER CHECKS:

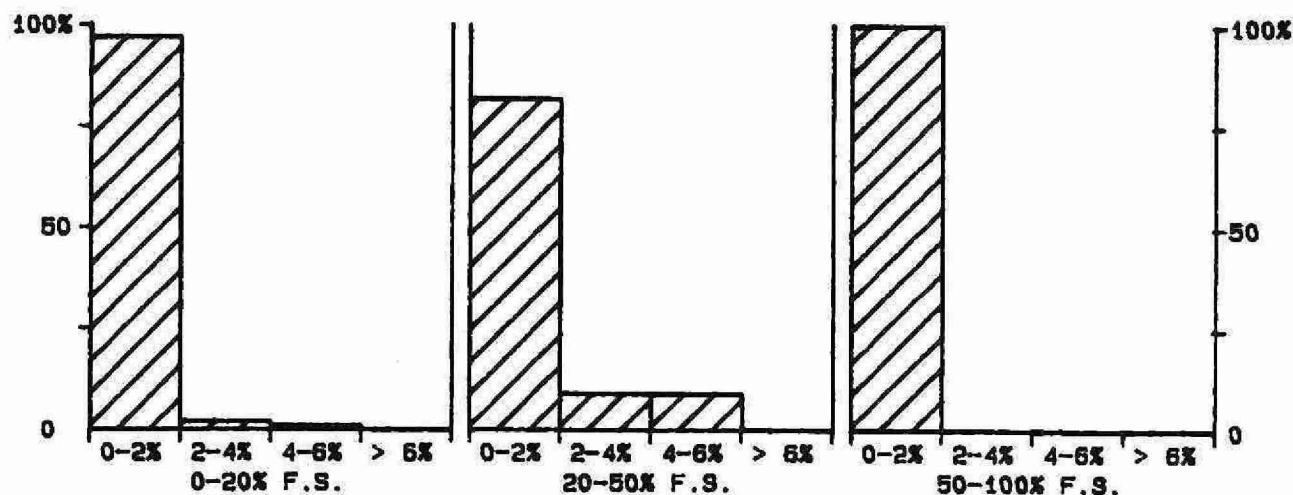
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	38	0.02	0.040

QUALITY CONTROL GRAPHS PRECIPITATION AMMONIA-PRAM (MG/L AS N)

FROM: 23/06/88
TO: 14/12/88



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 5 MG/L AS N

*** NITROGEN - AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/84
LIS Test Name Code	: NNHTFR,NNHTUR	Units	: mg/L as N
Work Station Code	: PRNUT	Unit Code	: 064807
Method Code	: 103CC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 5 mL
Container : Polystyrene

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects.
Approximate absorbance: 0.7 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 630 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 4 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL plus 3 standards every 10 samples

MODIFICATIONS:

01/05/84 -The procedure introduced on this date is the same as Method A for nitrogen-ammonia in HAMES except that the samples are not filtered and the full scale concentration is 5.00 mg/L as N.
01/06/88 -This workstation was retired. The analyses are now performed at the PRAM workstation, channels 1 and 2.

PRECIPITATION AMMONIA-PRNUT-NH3
QUALITY CONTROL DATA FROM 03/02/88 TO 06/06/88

Lab: Colourimetry

Analytical Range: - to 2.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	23	1.60	1.62	0.02	0.020
b :	23	0.80	0.81	0.01	0.010
a+b :	23	2.40	2.42	0.02	0.020
a-b :	23	0.80	0.81	0.01	0.014
c :	23	0.800	0.807	0.007	0.0103
d :	23	0.160	0.160	-0.000	0.0047
c+d :	23	0.960	0.966	0.006	0.0131
c-d :	23	0.640	0.647	0.007	0.0093

s.d.(AB): Sw(within run): 0.010 S(between runs): 0.016 S/Sw: 1.60

s.d.(CD): Sw(within run): 0.0066 S(between runs): 0.0080 S/Sw: 1.22

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31 to 2.49 for A+B
0.74 to 0.86 for A-B
0.870 to 1.050 for C+D
0.580 to 0.700 for C-D

DUPLICATES:

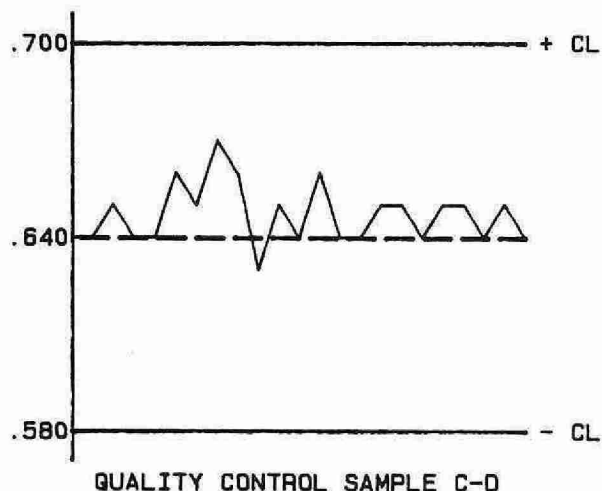
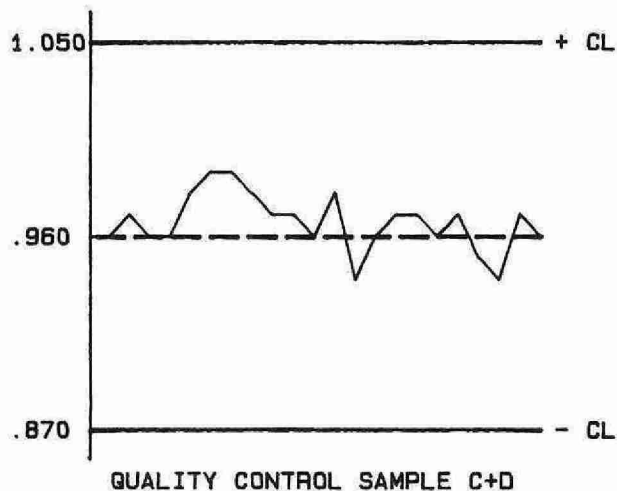
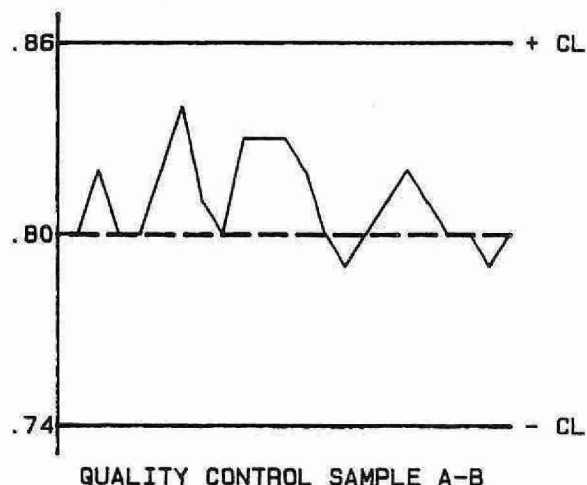
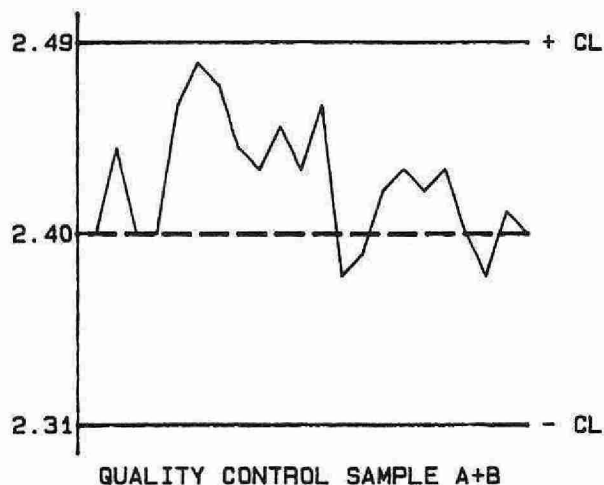
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
29	0.000 - 0.200	0.0077	12.2
16	0.200 - 0.400	0.0081	2.8
10	0.40 - 1.00	0.010	1.3
5	1.00 - 1.50	0.009	0.7
0	1.50 - 2.00	N/A	N/A
60	Overall	0.008	N/A

OTHER CHECKS:

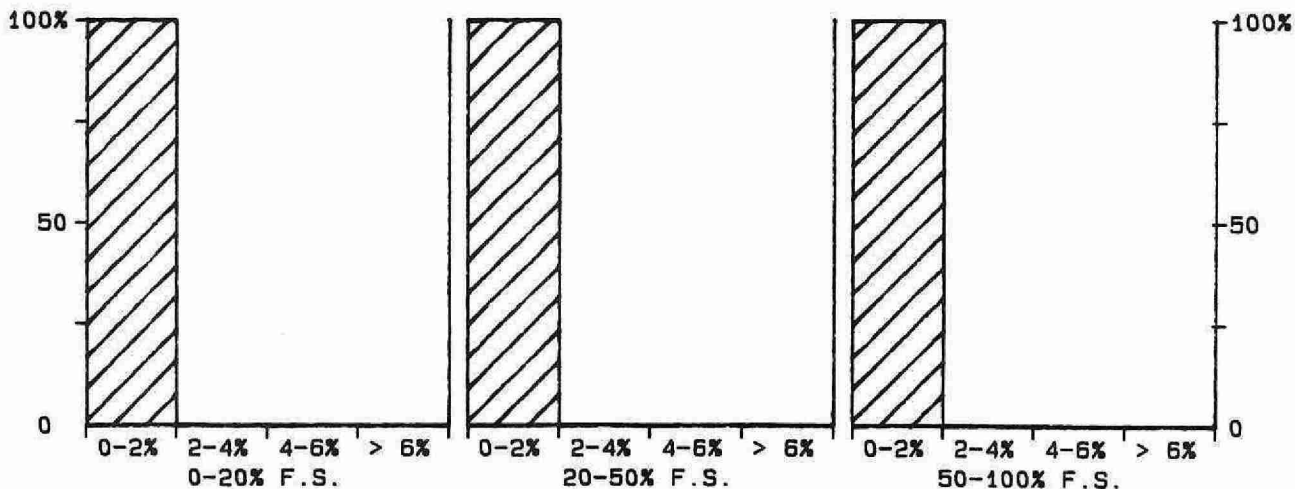
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	23	0.005	0.0010

QUALITY CONTROL GRAPHS **PRECIPITATION AMMONIA-PRNUT-NH3 (MG/L AS N)**

FROM: 03/02/88
 TO: 06/06/88



--- EXPECTED VALUE
 — CONTROL LIMIT (CL)



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 CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
 FULL SCALE VALUE (F.S.): 2 MG/L AS N

***** NITROGEN - AMMONIA PLUS AMMONIUM *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNHTFR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 103DC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic (polystyrene)

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects.

Approximate absorbance: 0.5 at the full scale level.

N.B. Nitrate plus nitrite, nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 630 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.002	T value: 0.01
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

MODIFICATIONS:

01/02/84 -Sample filtration was eliminated for all sample classes but Great Lakes (G).

15/05/84 -Commodore PET microcomputer system was introduced. At this time the number of calibration standards was increased from 3 to 7, and the calibration technique was changed from linear interpolation to the use of a quadratic.

01/10/84 -Sample filtration was eliminated for Great Lakes (G) samples.

12/02/86 -HP9920 microcomputer introduced to replace Commodore PET.

NITROGEN-AMMONIA+AMMONIUM - RNDNP
QUALITY CONTROL DATA FROM 02/02/88 TO 22/12/88

Lab: Colourimetry

Analytical Range: - to 2.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	133	1.60	1.61	0.01	0.016
b :	133	0.80	0.81	0.01	0.008
a+b :	133	2.40	2.41	0.01	0.019
a-b :	133	0.80	0.80	0.00	0.017
c :	133	0.80	0.81	0.01	0.008
d :	133	0.160	0.164	0.004	0.0084
c+d :	133	0.960	0.969	0.009	0.0134
c-d :	133	0.640	0.641	0.001	0.0088

s.d.(AB): Sw(within run): 0.012 S(between runs): 0.013 S/Sw: 1.05
s.d.(CD): Sw(within run): 0.006 S(between runs): 0.008 S/Sw: 1.32

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31 to 2.49 for A+B
0.74 to 0.86 for A-B
0.924 to 0.996 for C+D
0.616 to 0.664 for C-D

DUPLICATES:

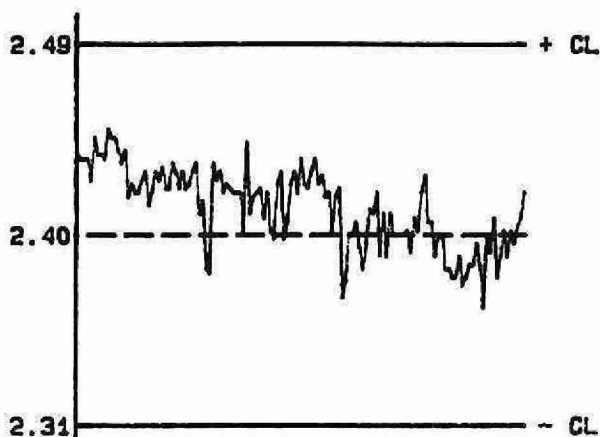
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
192	0.000 - 0.040	0.0047	23.6
97	0.040 - 0.100	0.0060	12.6
43	0.100 - 0.200	0.0050	3.5
27	0.200 - 0.400	0.0109	4.0
27	0.40 - 2.00	0.014	1.9
386	Overall	0.007	N/A

OTHER CHECKS:

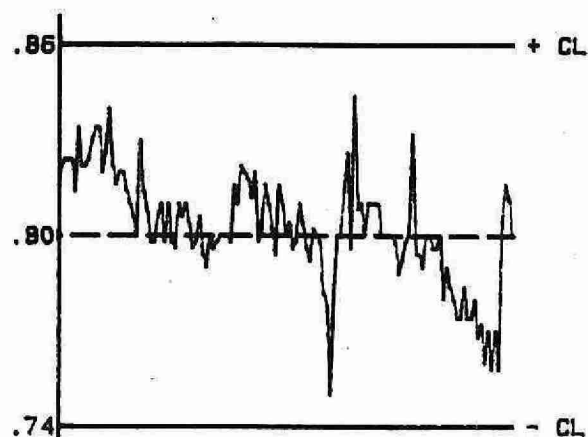
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	86	0.005	0.0024

QUALITY CONTROL GRAPHS NITROGEN-AMMONIA+AMMONIUM - RNDNP (MG/L AS N)

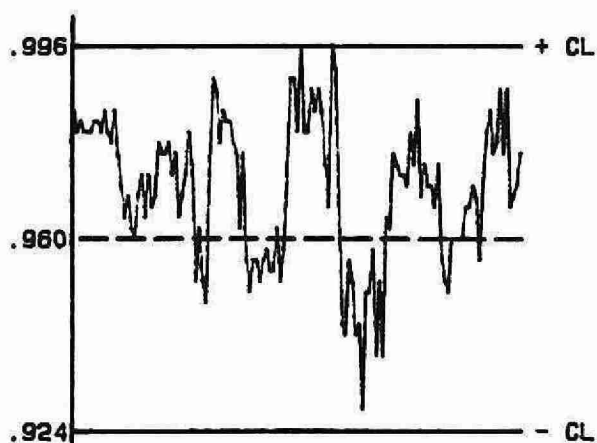
FROM: 02/02/88
TO: 22/12/88



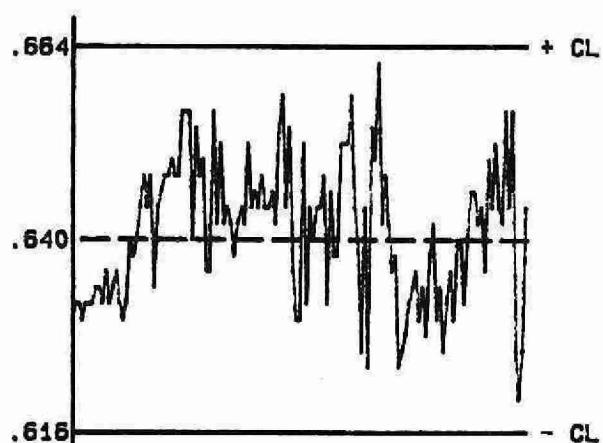
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

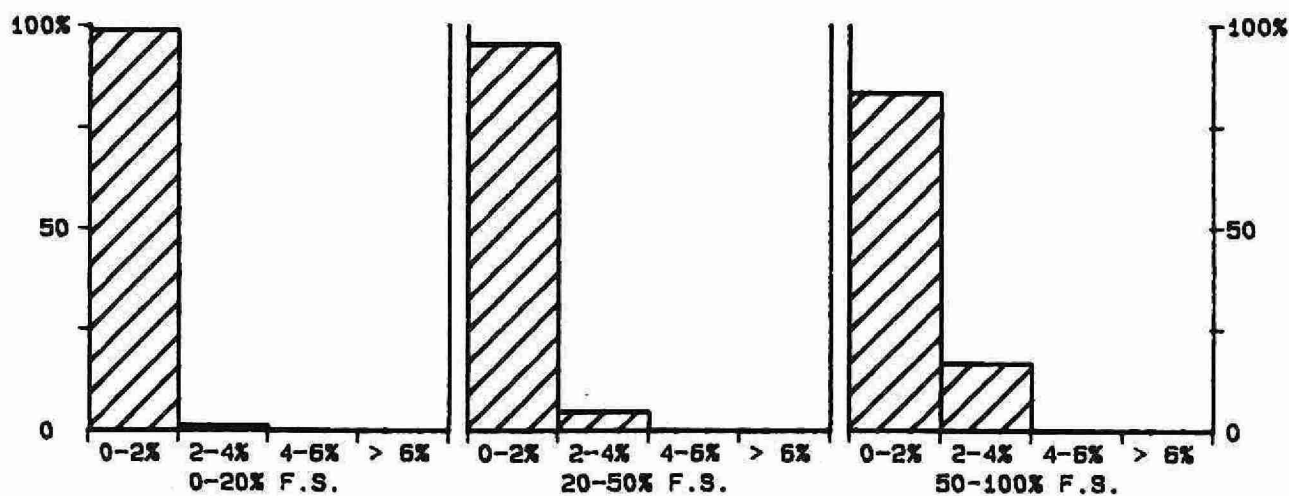


QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 MG/L AS N

***** NITROGEN - AMMONIA PLUS AMMONIUM *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/77
LIS Test Name Code	: NNHTFR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 103AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic (polystyrene)

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst.

Approximate absorbance: 0.7 at the full scale level.

N.B. Reactive orthophosphate, nitrogen-nitrite and nitrogen-nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus one 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 630 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

MODIFICATIONS:

01/02/84 -Sample filtration was eliminated for all sample classes.

18/06/86 -HP9920 microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to quadratic using 6 standards instead of 2. One analytical range is now used.

NITROGEN-AMMONIA+AMMONIUM-SONP
QUALITY CONTROL DATA FROM 02/02/88 TO 29/12/88

Lab: Colourimetry

Analytical Range: - to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	147	40.0	39.9	-0.1	0.31
b :	147	20.0	20.0	0.0	0.17
a+b :	147	60.0	59.9	-0.1	0.43
a-b :	147	20.0	20.0	0.0	0.26
c :	147	20.00	19.98	-0.02	0.173
d :	147	4.00	3.97	-0.03	0.070
c+d :	147	24.00	23.95	-0.05	0.210
c-d :	147	16.00	16.01	0.01	0.160

s.d.(AB): Sw(within run): 0.18 S(between runs): 0.25 S/Sw: 1.36
s.d.(CD): Sw(within run): 0.113 S(between runs): 0.132 S/Sw: 1.17

On any given day the calibration is accepted if the values obtained lie within the ranges:

57.8 to 62.2 for A+B
18.5 to 21.5 for A-B
23.10 to 24.90 for C+D
15.40 to 16.60 for C-D

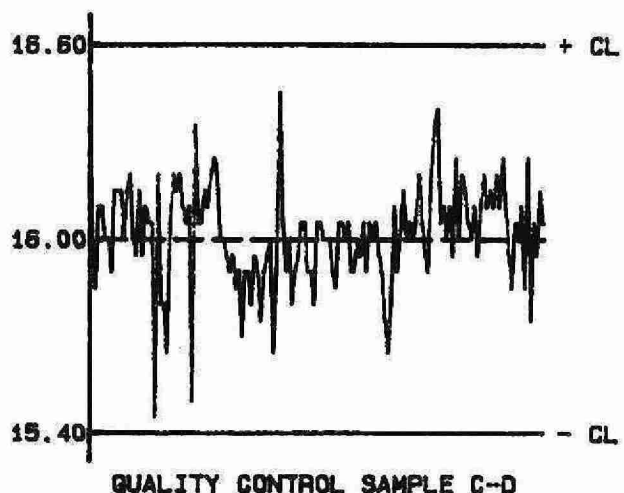
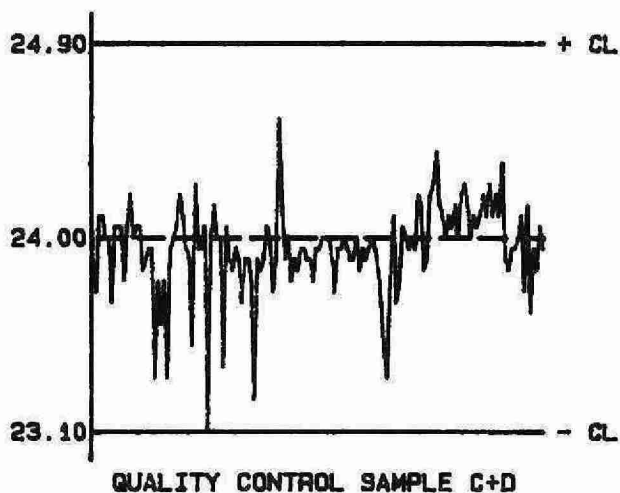
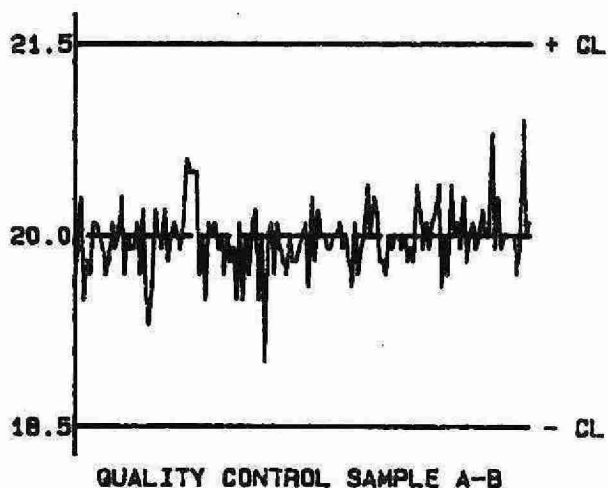
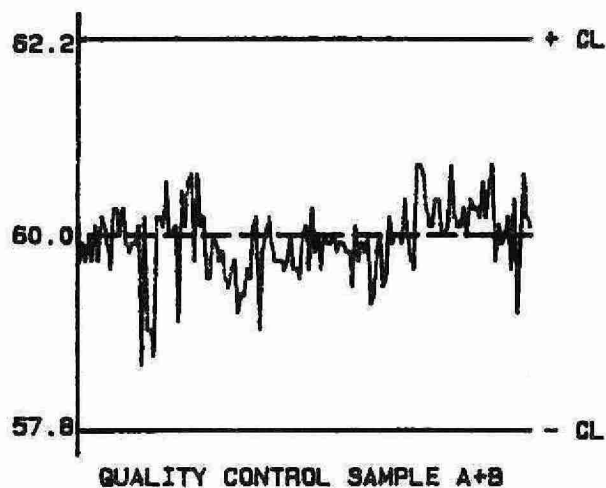
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	315	0.00 - 2.00	0.067	25.1
	31	2.00 - 5.00	0.109	3.4
	41	5.00 - 10.00	0.365	4.8
	40	10.0 - 20.0	0.46	3.0
	9	20.0 - 50.0	0.56	2.0
	436	Overall	0.21	N/A

OTHER CHECKS:

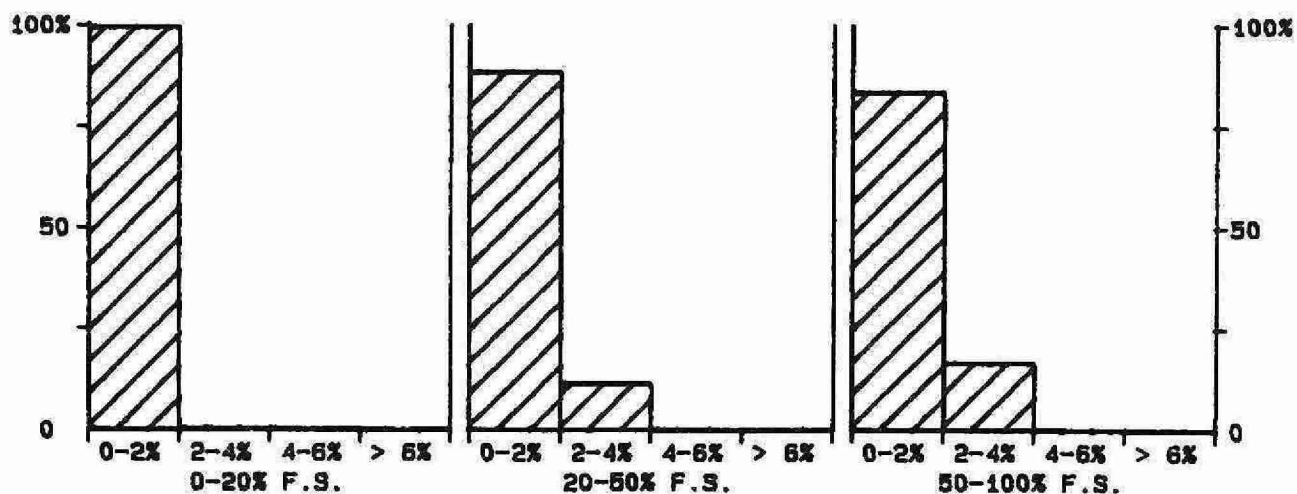
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	135	0.06	0.040

QUALITY CONTROL GRAPHS NITROGEN-AMMONIA+AMMONIUM-SDNP (MG/L AS N)

FROM: 02/02/88
TO: 29/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 50 MG/L AS N
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***** NITROGEN-AMMONIA PLUS AMMONIUM *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/06/76
LIS Test Name Code	: NNHTFR	Units	: ug/L as N
Work Station Code	: DONUT	Unit Code	: 063807
Method Code	: 1524C2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation, and Soil Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: PET-500 ml Jars

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects.

Approximate absorbance : 0.40 at the full scale level.

N.B. Nitrate plus nitrite is determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 5.0 cm. light path at 630 nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3

Current W value: 1

T value: 5

CALIBRATION:

BL plus 8 standards

CONTROLS:

Calibration	: LTBL plus 4 standards, e.g. QCA
Drift	: BL plus 1 standard

NITROGEN-AMMONIA + AMMONIUM (DONUT)
QUALITY CONTROL DATA FROM 08/01/88 TO 30/12/88

Lab: Dorset

Analytical Range: - to 1000 ug/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	56	750	752	2	5.1
b :	56	250	252	2	5.9
a+b :	56	1000	1004	4	8.5
a-b :	56	500	500	0	7.0
c :	55	75.0	73.9	-1.1	2.58
d :	55	25.0	25.0	0.0	1.94
c+d :	55	100.0	98.9	-1.1	3.55
c-d :	55	50.0	48.8	-1.2	2.87

s.d.(AB): Sw(within run): 4.9 S(between runs): 5.5 S/Sw: 1.11
s.d.(CD): Sw(within run): 2.03 S(between runs): 2.28 S/Sw: 1.12

On any given day the calibration is accepted if the values obtained lie within the ranges:

970 to 1030 for A+B
490 to 520 for A-B
88.0 to 112.0 for C+D
42.0 to 58.0 for C-D

DUPLICATES:

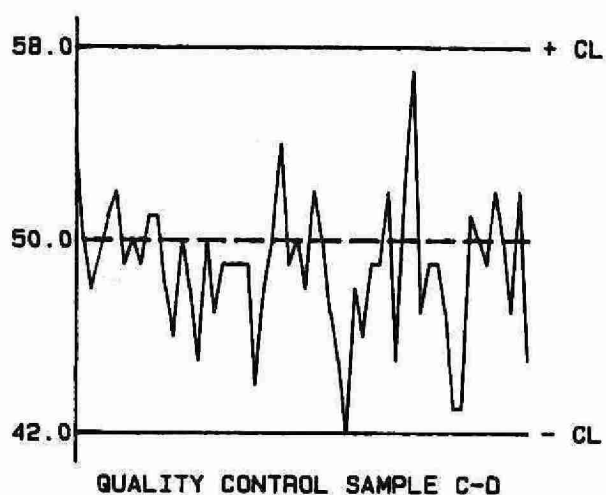
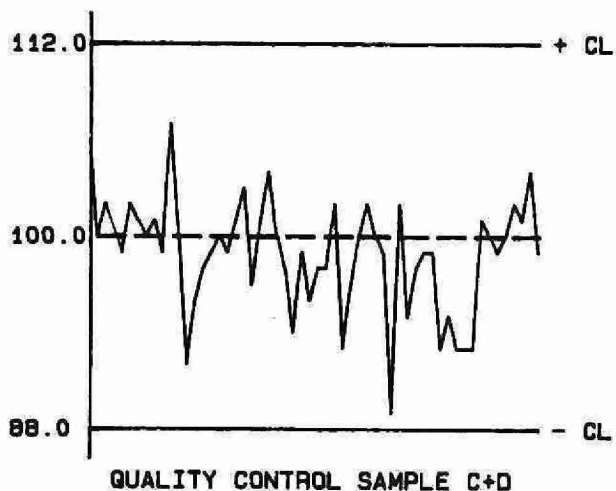
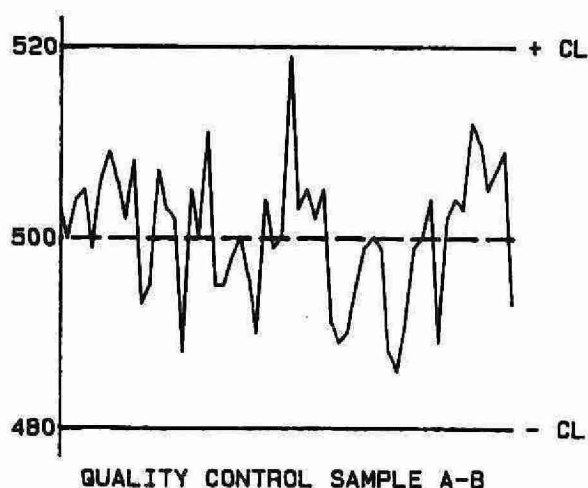
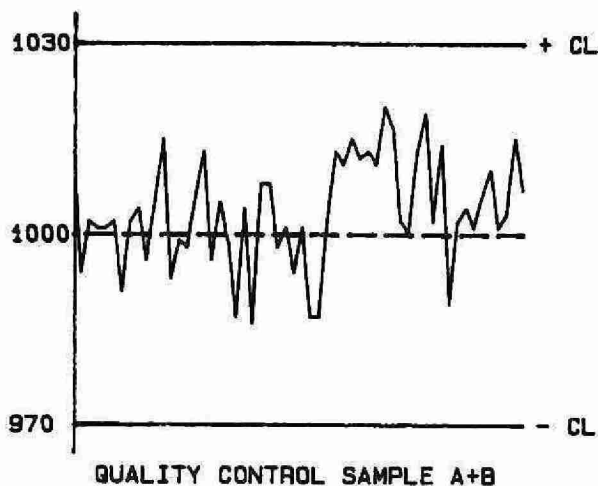
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
89	0.0 - 25.0	1.25	15.7
26	25.0 - 50.0	1.55	4.3
16	50.0 - 100.0	1.76	2.3
22	100 - 500	4.2	1.9
2	500 - 1000	5.8	0.8
155	Overall	2.1	N/A

OTHER CHECKS:

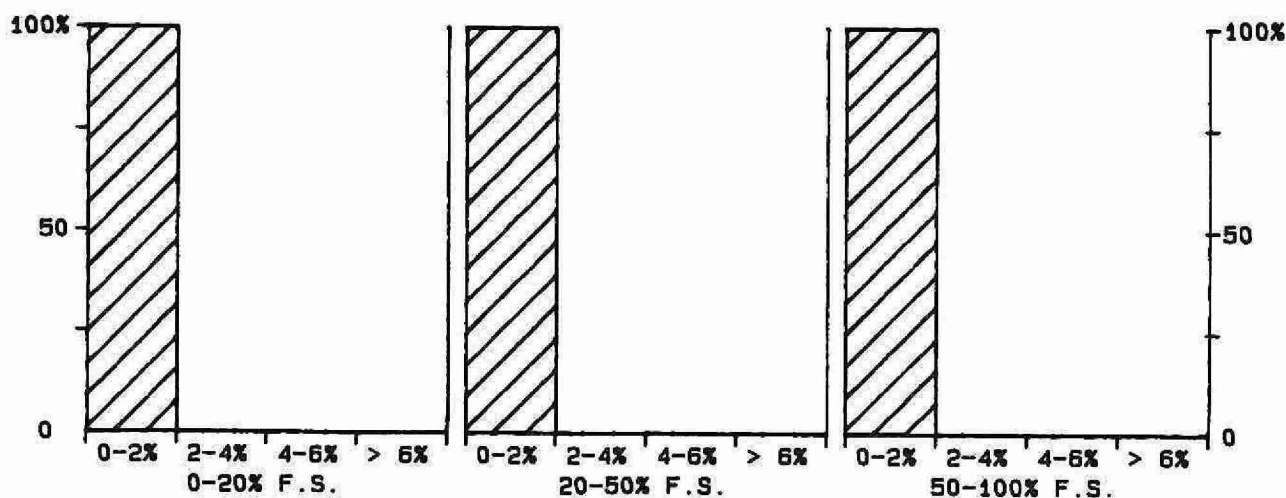
	Number of Data	Data Mean	Standard(1) Deviation
STD. CAL. :	56	108	16.3
Long Term Blank :	56	1.4	1.78

QUALITY CONTROL GRAPHS NITROGEN-AMMONIA + AMMONIUM (DONUT) (UG/L AS N)

FROM: 08/01/88
 TO: 30/12/88



--- EXPECTED VALUE
 — CONTROL LIMIT (CL)



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 CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
 FULL SCALE VALUE (F.S.): 1000 UG/L AS N

***** NITROGEN - NITRATE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: NNO3FR,NNRICF	Units	: ug/Filter as N
Work Station Code	: PRSEQ	Unit Code	: 361807
Method Code	: 004AIO	Supervisor	: F. Lo
Sample Type/Matrix	: Teflon and nylon filters from sequential filter packs and nylon filters from LoVol filter packs.		

SAMPLING:

Quantity Required : 1 filter
Container : 50 ml Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 25.0 mL of DDW (Teflon) or 25.0 mL of 0.03 N NaOH (nylon) in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by the comparison of the sample scan to a series of standard scans. Results are converted to ug/filter as N.
Full scale conductivity: 30 uS/cm.
N.B. Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; polyethylene tubes
Automated modular continuous flow ion chromatographic system

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

MODIFICATIONS:

01/07/80 -Ion chromatographic procedure for precipitation samples was modified for analysis of Teflon and nylon filter extracts by developing the above filter extraction procedure.
10/03/84 -Microcomputer for automated sampling and timing was introduced. At that time automated spiking of samples with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ was introduced.
10/05/85 -Microcomputer used for data reduction. Three additional calibration standards were set up.
April 1986 -Varian Spectrix, model 4270, introduced to convert calculation data to quadratic equation and calculate preliminary analyte concentration.
June 1988 -Direct Computer Input introduced. Uploading of instrument signal, calculation of analyte concentrations, and transmission of analytical results to LIS now done automatically.

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

NITROGEN-NITRATE-PRSEQ
QUALITY CONTROL DATA FROM 06/01/88 TO 22/12/88

Lab: Ion Chromatography

Analytical Range: - to 50.0 ug/Filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	79	40.0	40.2	0.2	0.40
b :	79	10.0	10.1	0.1	0.20
a+b :	79	50.0	50.3	0.3	0.46
a-b :	79	30.0	30.0	0.0	0.43

s.d.(AB): Sw(within run): 0.30 S(between runs): 0.32 S/Sw: 1.04

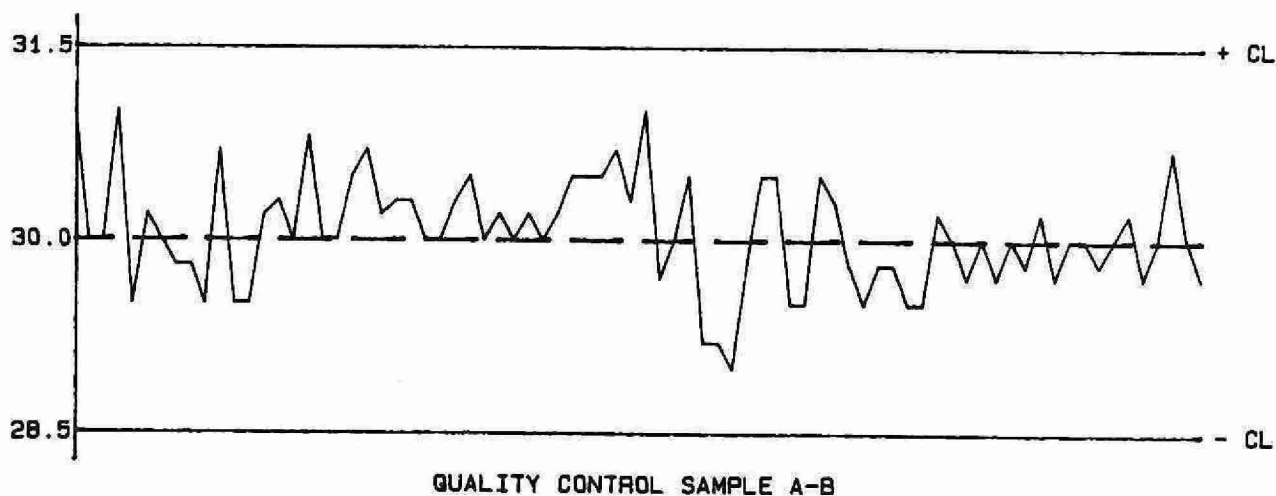
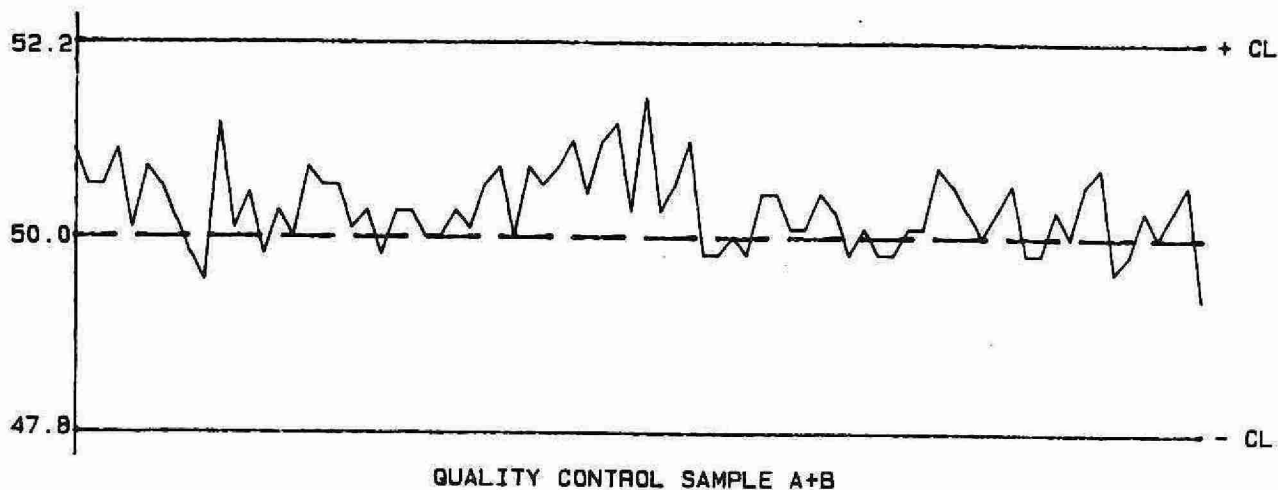
On any given day the calibration is accepted if the values obtained lie within the ranges:

47.8 to 52.2 for A+B
 28.5 to 31.5 for A-B

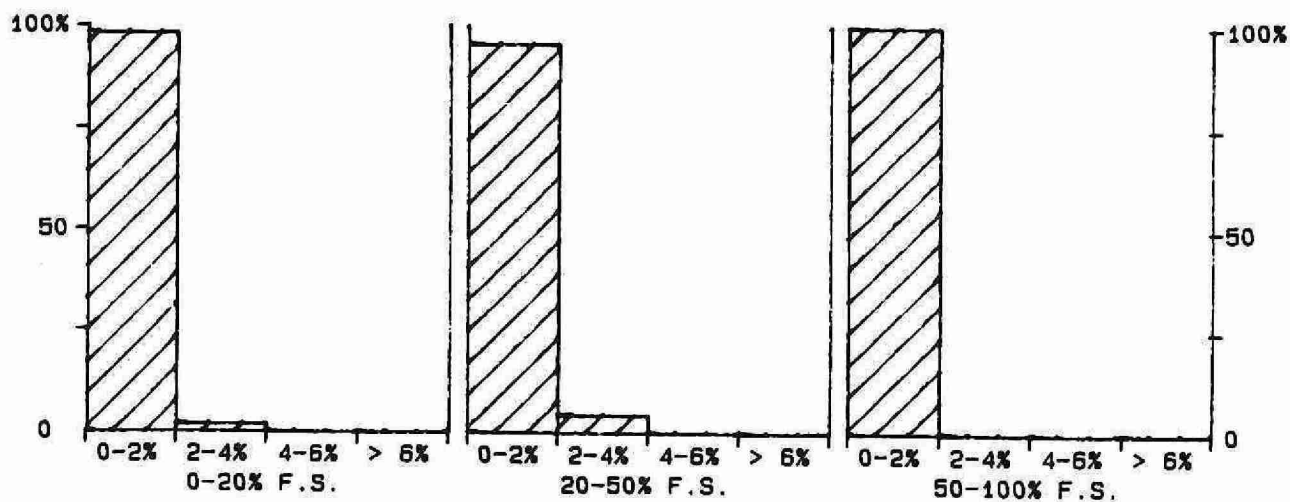
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	93	0.00 - 5.00	0.244	15.0
	21	5.0 - 10.0	0.24	3.6
	23	10.0 - 25.0	0.35	2.2
	13	25.0 - 50.0	0.40	1.2
	150	Overall	0.28	N/A

QUALITY CONTROL GRAPHS NITROGEN-NITRATE-PRSEQ (UG/FILTER AS N)

FROM: 06/01/88
TO: 22/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 50 UG/FILTER AS N

***** NITROGEN - NITRATE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO3UR	Units	: mg/L as N
Work Station Code	: PRIC1	Unit Code	: 064807
Method Code	: 003AI0	Supervisor	: F. Lo
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 15 mL
Container : Polystyrene bottle

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L N is determined by the comparison of the sample scan to a series of standard scans. Full scale conductivity: 10 uS/cm.
N.B. Sulphate and chloride are determined simultaneously.

INSTRUMENTATION:

Basic modular continuous flow ion chromatographic system plus microcomputer for automated sample introduction, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

MODIFICATIONS:

01/04/86 -Varian Spectrex Model 4270 was introduced to convert calibration data to a quadratic equation and calculate preliminary sample concentrations; the latter, however, still have to be manually corrected for in-run sensitivity changes.
June 1988 -Direct Computer Input introduced. Uploading of instrument signal, calculation of analyte concentrations, and transmission of analytical results to LIS now done automatically.

NITROGEN-NITRATE-PRIC1
QUALITY CONTROL DATA FROM 05/01/88 TO 19/12/88

Lab: Ion Chromatography

Analytical Range: - to 2.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	91	1.60	1.60	0.00	0.012
b :	91	0.40	0.40	0.00	0.009
a+b :	91	2.00	2.01	0.01	0.017
a-b :	91	1.20	1.20	0.00	0.012

s.d.(AB): Sw(within run): 0.008 S(between runs): 0.011 S/Sw: 1.25

On any given day the calibration is accepted if the values obtained lie within the ranges:

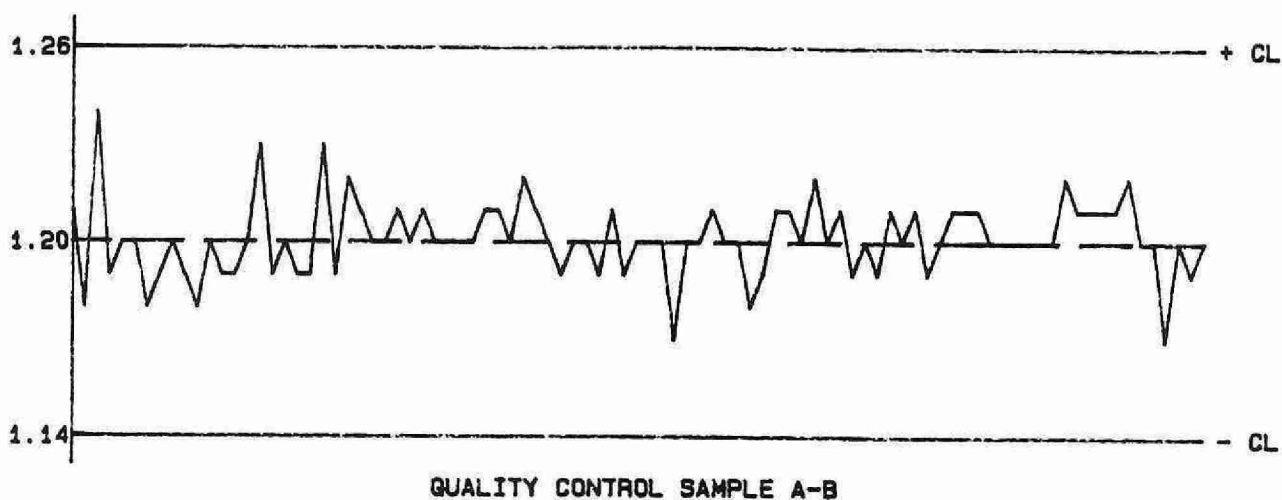
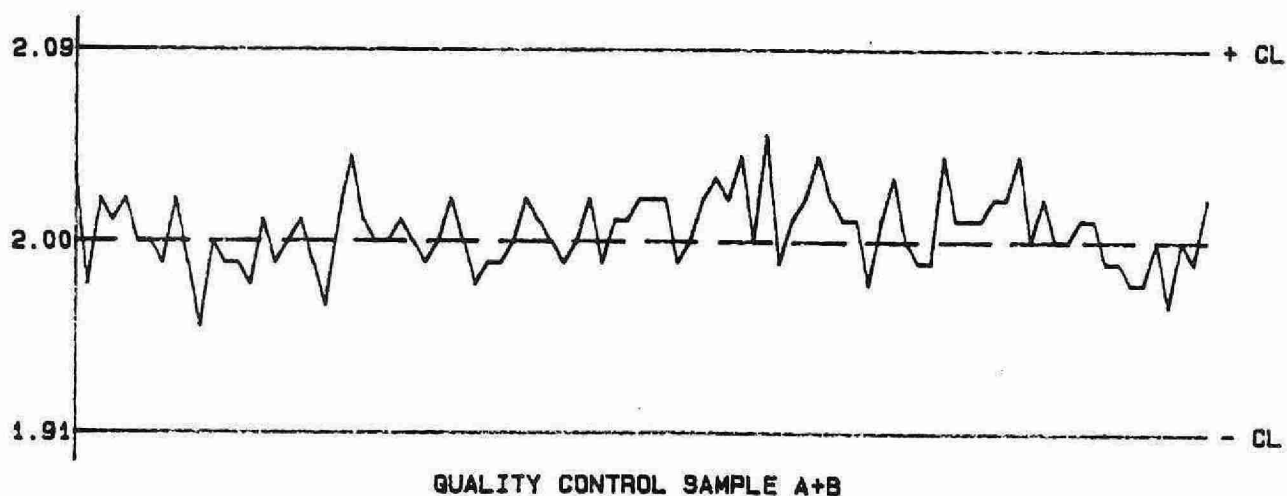
1.91 to 2.09 for A+B
1.14 to 1.26 for A-B

DUPLICATES:

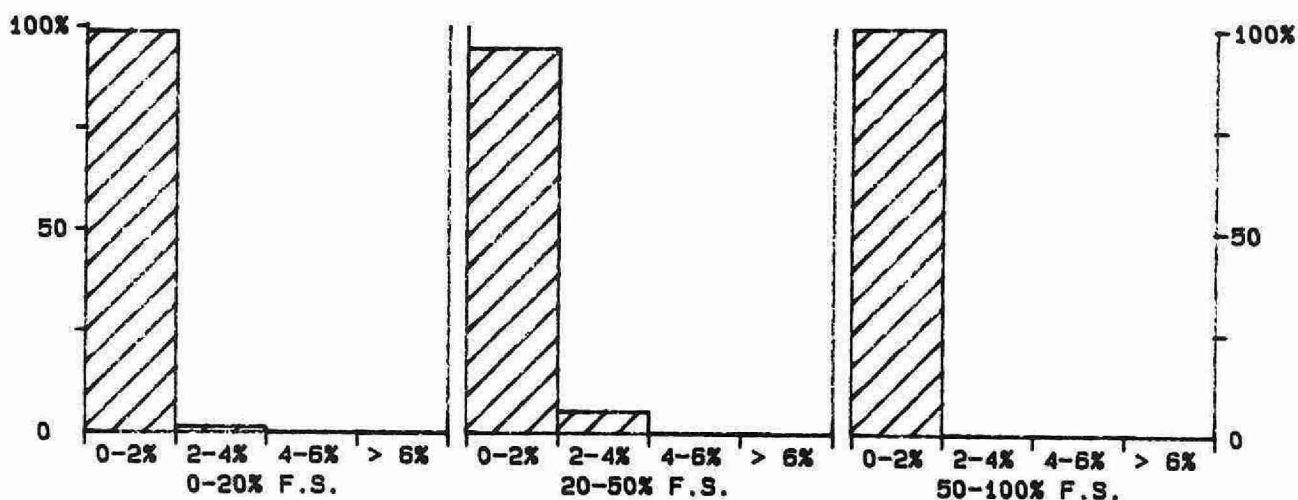
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
98	0.00 - 0.20	0.008	9.0
69	0.20 - 0.50	0.009	2.8
40	0.50 - 1.00	0.013	1.7
16	1.00 - 2.00	0.014	1.1
223	Overall	0.010	N/A

QUALITY CONTROL GRAPHS NITROGEN-NITRATE-PRIC1 (MG/L AS N)

FROM: 05/01/88
TO: 19/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 MG/L AS N

***** NITROGEN - NITRATE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: NNO3UR	Units	: ug/Filter as N
Work Station Code	: PRLOV	Unit Code	: 361807
Method Code	: 004AIC	Supervisor	: F. Lo
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by the comparison of the sample scan to a series of standard scans. Results are converted to ug/filter as N.

Full scale conductivity: 30 uS/cm.

N.B. Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; polyethylene tubes
Automated modular continuous flow ion chromatographic system

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

MODIFICATIONS:

01/08/81 -Ion chromatographic procedure for precipitation samples was modified for analysis of LoVol W40 filter extracts by developing the above filter extraction procedure.

10/03/84 -Microcomputer for automated sampling and timing was introduced. At that time automated spiking of samples with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ was introduced.

10/05/85 -Microcomputer used for data reduction. Three additional calibration standards were set up.

April 1986 -Varian Spectrix, model 4270, introduced to convert calculation data to quadratic equation and calculate preliminary analyte concentration.

June 1988 -Direct Computer Input introduced. Instrument signal uploading, calculation of analyte concentrations, and transmission of analytical results to LIS now done automatically.

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

No data summary is available for period not covered in performance report.

NITROGEN-NITRATE-PRLOV
QUALITY CONTROL DATA FROM 03/01/88 TO 12/10/88

Lab: Ion Chromatography

Analytical Range: - to 100.0 ug/Filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	34	80.0	80.4	0.4	0.88
b :	34	20.0	20.2	0.2	0.41
a+b :	34	100.0	100.5	0.5	0.93
a-b :	34	60.0	60.2	0.2	1.00

s.d.(AB): Sw(within run): 0.71 S(between runs): 0.69 S/Sw: 0.97

On any given day the calibration is accepted if the values obtained lie within the ranges:

95.5 to 104.5 for A+B
 57.0 to 63.0 for A-B

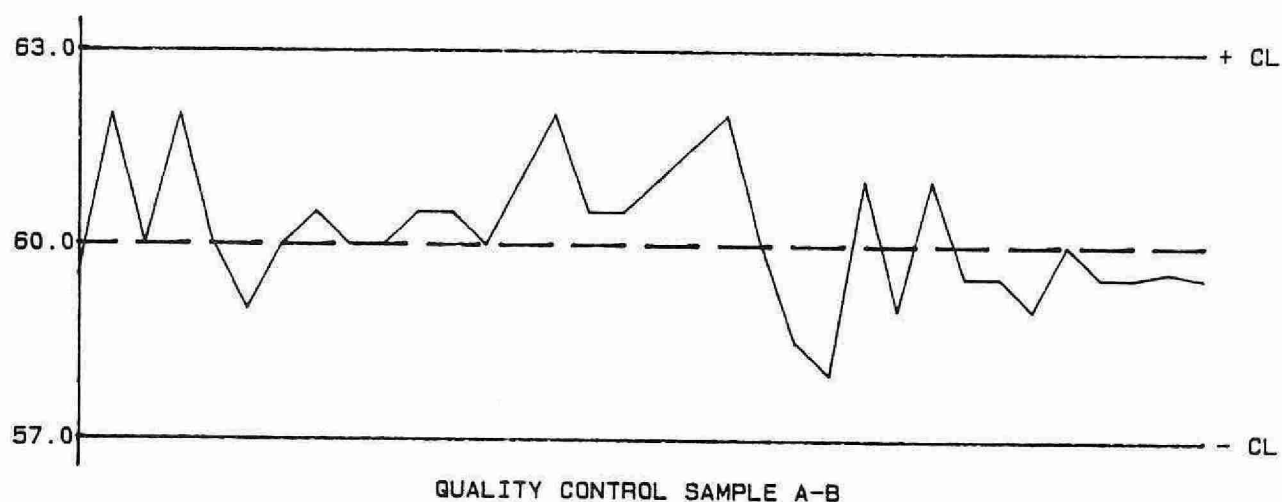
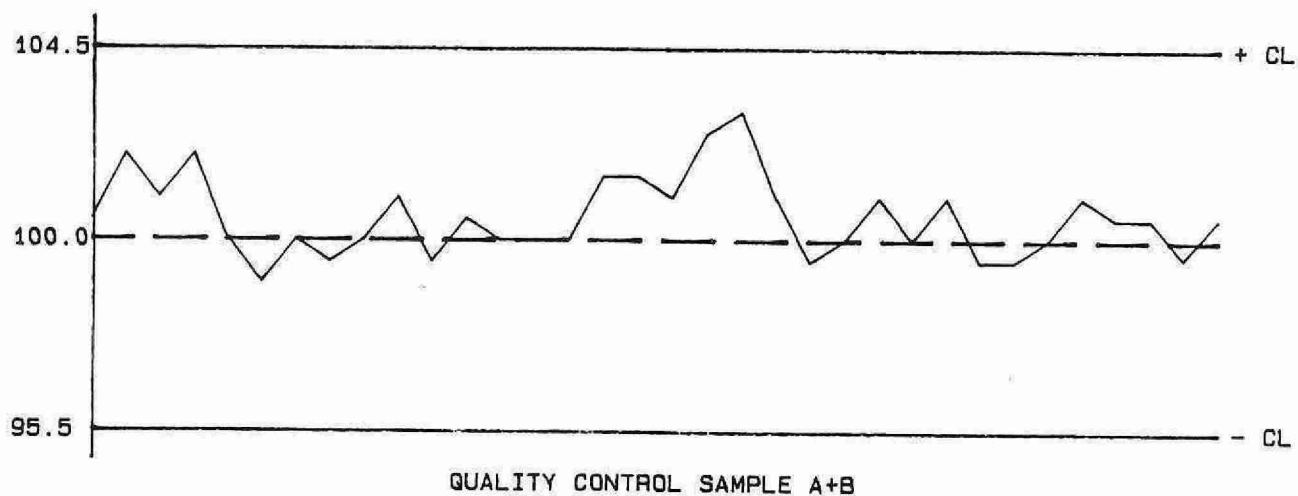
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
20	0.0 - 10.0	0.35	13.3
7	10.0 - 25.0	0.37	2.3
4	25.0 - 50.0	0.48	1.5
6	50.0 - 100.0	0.81	1.1
37	Overall	0.48	N/A

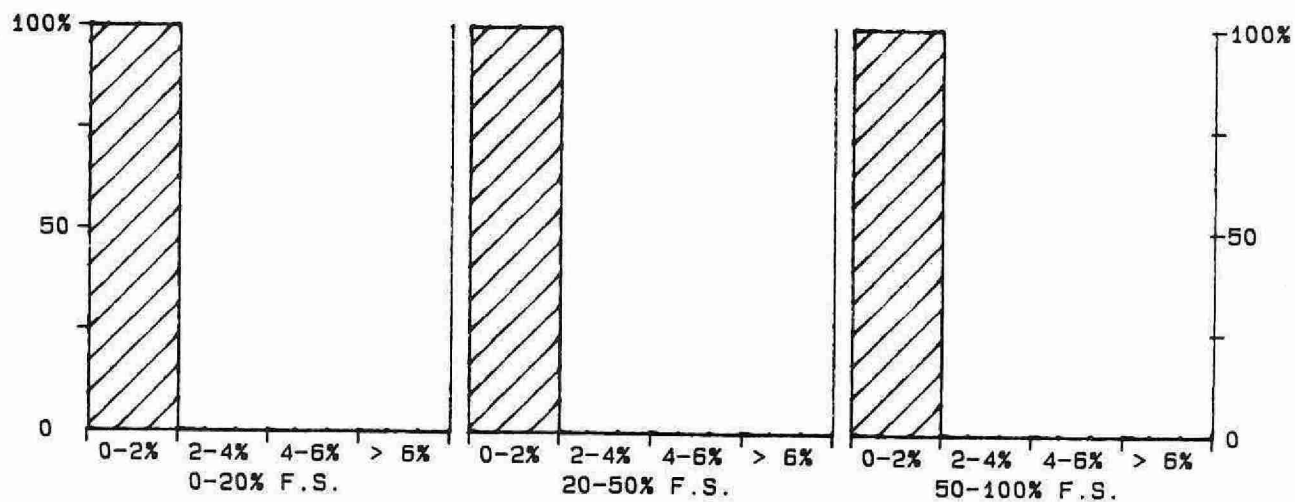
QUALITY CONTROL GRAPHS NITROGEN-NITRATE-PRLOV (UG/FILTER AS N)

FROM: 03/01/88

TO: 12/10/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 UG/FILTER AS N

*****NITROGEN - NITRATE PLUS NITRITE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNOTFR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 102DC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.
Approximate absorbance: 0.6 at the full scale level.
N.B. Ammonia plus ammonium, nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37°C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 1.5 cm. light path at 520 nm.
Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.005	T value: 0.025
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

MODIFICATIONS:

01/02/84 -Sample filtration was eliminated for all sample classes but Great Lakes (G).
15/05/84 -Commodore PET microcomputer system was introduced. At this time the number of calibration standards was increased from 3 to 7, and the calibration technique changed from linear interpolation to the use of a quadratic.
01/10/84 -Sample filtration was eliminated for Great Lakes (G) samples.
12/02/86 -HP9920 microcomputer introduced to replace Commodore PET.

NITROGEN-NITRATE PLUS NITRITE-RNOMP-NOT
QUALITY CONTROL DATA FROM 02/02/88 TO 22/12/88

Lab: Colourimetry

Analytical Range: - to 5.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	134	4.00	4.01	0.01	0.037
b :	134	2.00	2.00	-0.00	0.020
a+b :	134	6.00	6.00	0.00	0.046
a-b :	134	2.00	2.01	0.01	0.039
c :	134	2.00	2.00	-0.00	0.020
d :	134	0.40	0.40	-0.00	0.009
c+d :	134	2.40	2.40	-0.00	0.025
c-d :	134	1.60	1.60	-0.00	0.020

s.d.(AB): Sw(within run): 0.028 S(between runs): 0.030 S/Sw: 1.08
s.d.(CD): Sw(within run): 0.014 S(between runs): 0.016 S/Sw: 1.10

On any given day the calibration is accepted if the values obtained lie within the ranges:

5.77 to 6.23 for A+B
1.85 to 2.15 for A-B
2.31 to 2.49 for C+D
1.54 to 1.66 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	170	0.00 - 0.20	0.024	50.2
	5	0.20 - 0.50	0.020	6.1
	76	0.50 - 1.00	0.020	2.6
	26	1.00 - 2.50	0.059	3.7
	27	2.50 - 5.00	0.056	1.7
	304	Overall	0.032	N/A

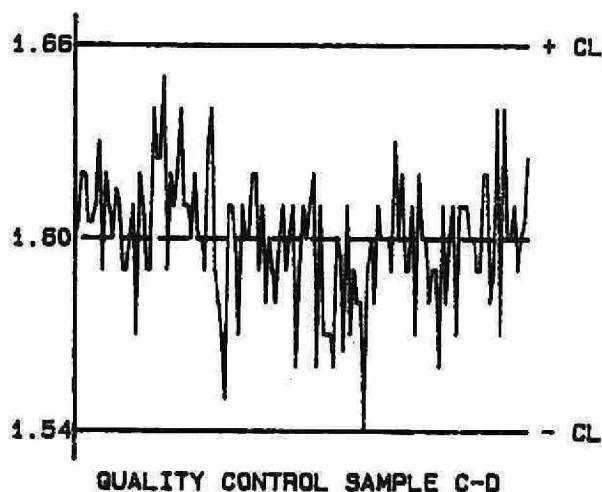
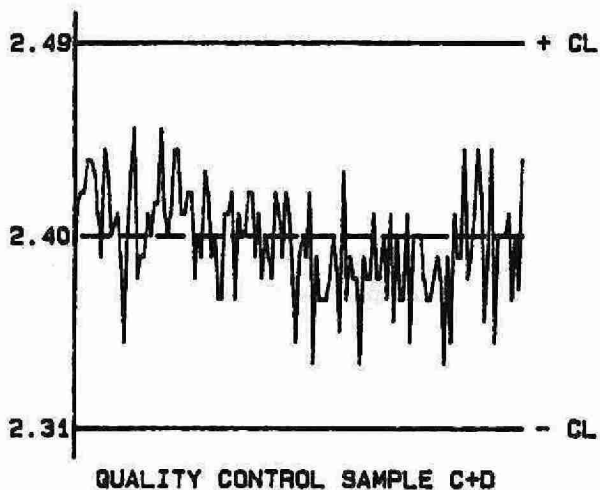
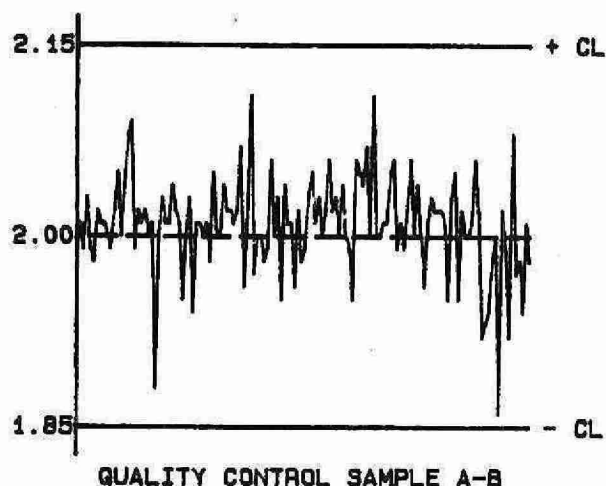
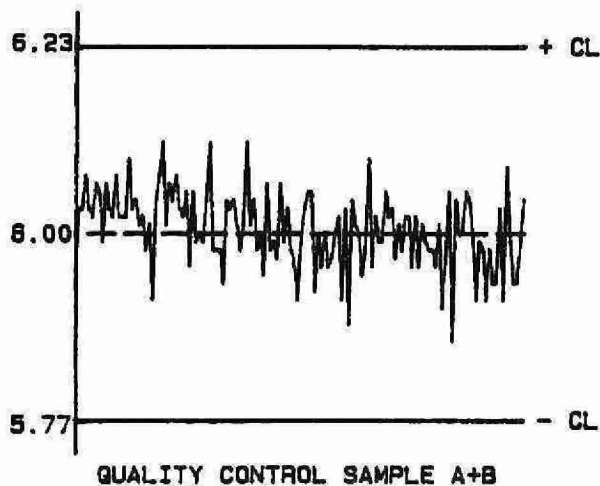
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	60	0.01	0.006

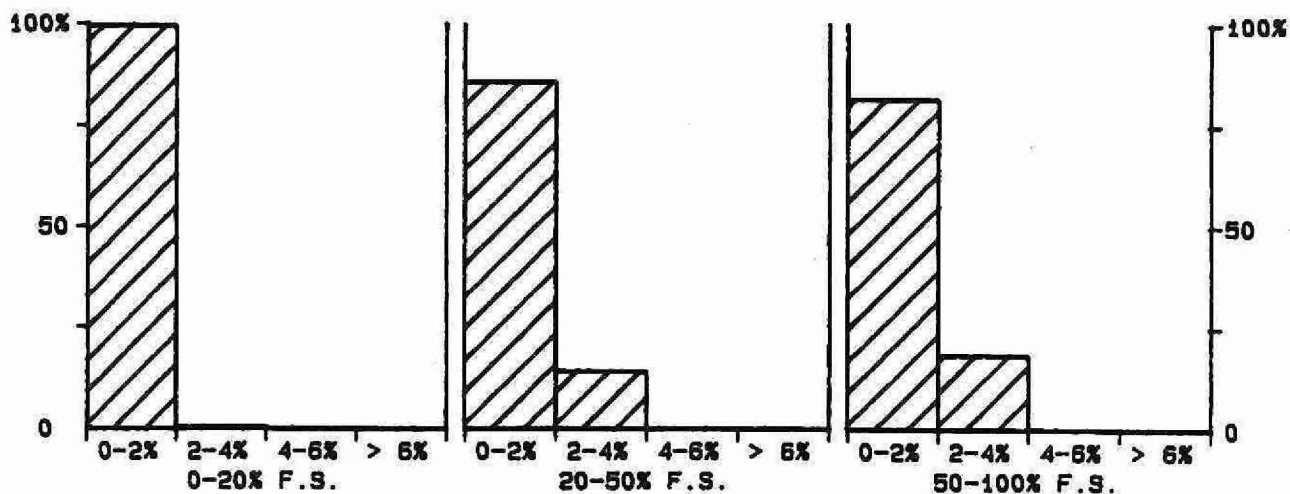
QUALITY CONTROL GRAPHS

FROM: 02/02/88
TO: 22/12/88

NITROGEN-NITRATE PLUS NITRITE-RNDNP-NOT (MG/L AS N)



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 5 MG/L AS N

***** NITROGEN - NITRATE PLUS NITRITE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNOTFR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 102CC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters		

SAMPLING:

Quantity Required : 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride.

Approximate absorbance: 0.7 at the full scale level.

N.B. Ammonia plus ammonium, nitrite, and reactive phosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 520 nm. Two analytical ranges are obtained from the output of the colourimeter. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; standard every 20 samples
Interference : Nitrite standard (nitrate and nitrite at same concentration run separately: zero difference is expected) confirms effective operation of reduction step. Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression by sample dilution.

MODIFICATIONS:

01/06/85 -Ion exchange column was removed and replaced by increasing in-line sample dilution to the point that the interference check showed control could be retained and no loss in performance was observed.

18/06/86 -HP9920 microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to quadratic using 6 standards instead of 2.

NITROGEN-NITRATE+NITRITE-SONP
QUALITY CONTROL DATA FROM 02/02/88 TO 29/12/88

Lab: Colourimetry

Analytical Range: - to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	147	40.0	40.2	0.2	0.29
b :	147	20.0	20.0	0.0	0.16
a+b :	147	60.0	60.2	0.2	0.39
a-b :	147	20.0	20.1	0.1	0.26
c :	147	20.00	20.03	0.03	0.160
d :	147	4.00	3.98	-0.02	0.057
c+d :	147	24.00	24.01	0.01	0.193
c-d :	147	16.00	16.04	0.04	0.144

s.d.(AB): Sw(within run): 0.18 S(between runs): 0.23 S/Sw: 1.27
s.d.(CD): Sw(within run): 0.102 S(between runs): 0.120 S/Sw: 1.18

On any given day the calibration is accepted if the values obtained lie within the ranges:

58.2 to 61.8 for A+B
18.8 to 21.2 for A-B
23.01 to 24.99 for C+D
15.34 to 16.66 for C-D

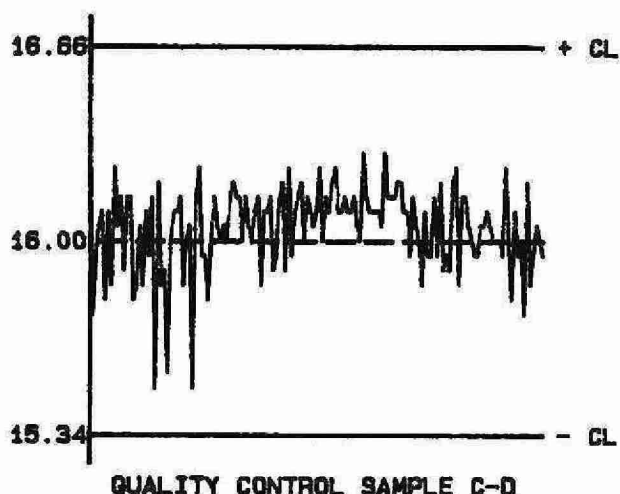
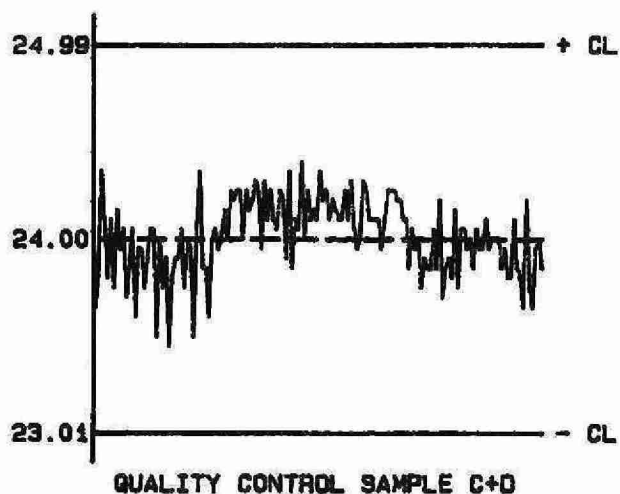
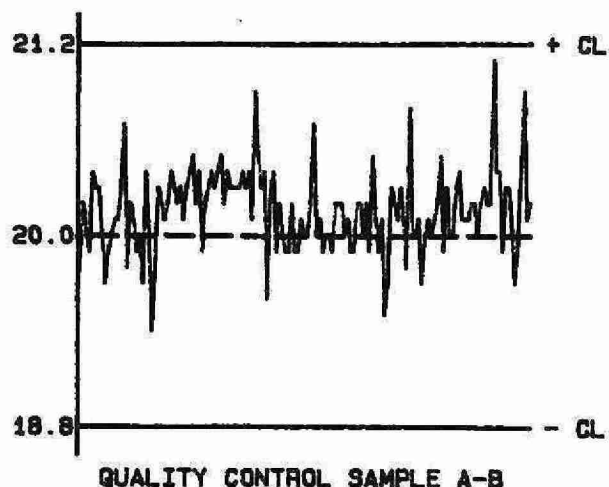
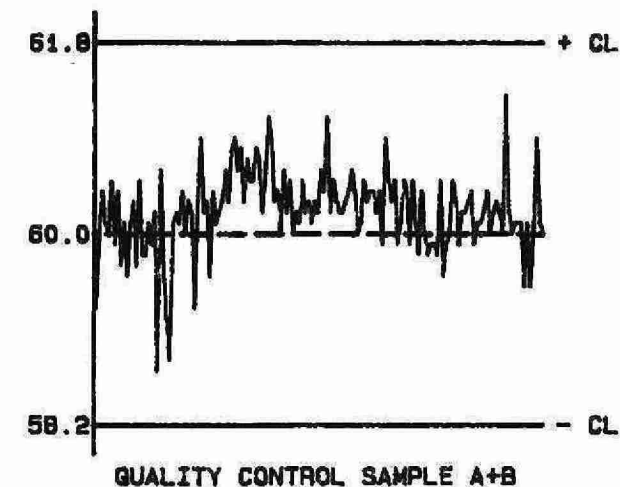
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean (2) s.d.	Coefficient of var.(%)
	223	0.00 - 2.00	0.070	13.7
	62	2.00 - 5.00	0.185	5.3
	51	5.00 - 10.00	0.317	4.3
	76	10.0 - 20.0	0.30	2.0
	24	20.0 - 50.0	0.48	1.8
	436	Overall	0.22	N/A

OTHER CHECKS:

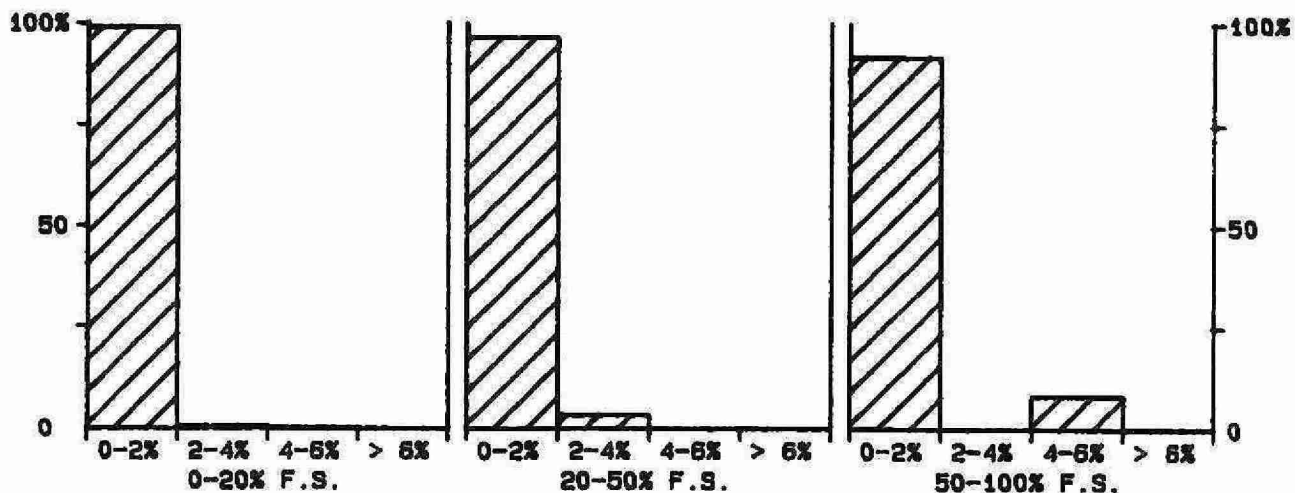
	Number of Data	Data Mean	Standard (1) Deviation
Long Term Blank :	38	0.08	0.036

QUALITY CONTROL GRAPHS NITROGEN-NITRATE+NITRITE-SONP (MG/L AS N)

FROM: 02/02/88
TO: 29/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



***** NITROGEN - NITRATE PLUS NITRITE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/76
LIS Test Name Code	: NNOTUR	Units	: mg/L as N
Work Station Code	: WFNO3	Unit Code	: 064807
Method Code	: 002CC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Ministry of Health Water Samples		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step. Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37°C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 1.5 cm. light path at 520 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.1	T value: 0.5
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CALIBRATION:

BL plus 6 standards.

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

MODIFICATIONS:

1986 -Automated data capture and reduction (DCI) introduced.

NITRATE+NITRITE-WFN03
QUALITY CONTROL DATA FROM 01/03/88 TO 15/12/88

Lab: Colourimetry

Analytical Range: - to 20.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	92	15.0	15.0	0.0	0.13
b :	92	8.0	8.0	0.0	0.09
a+b :	92	24.0	24.0	0.0	0.18
a-b :	92	8.0	8.0	-0.0	0.14
c :	92	8.00	8.02	0.02	0.087
d :	92	1.60	1.60	-0.00	0.026
c+d :	92	9.60	9.62	0.02	0.091
c-d :	92	6.40	6.42	0.02	0.091

s.d.(AB): Sw(within run): 0.10 S(between runs): 0.11 S/Sw: 1.13
s.d.(CD): Sw(within run): 0.064 S(between runs): 0.064 S/Sw: 1.00

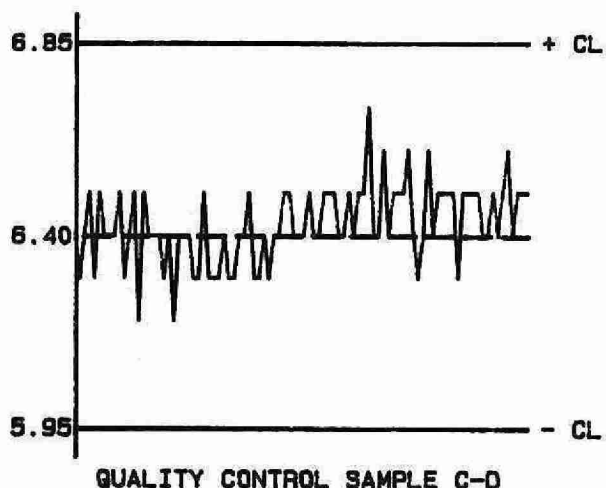
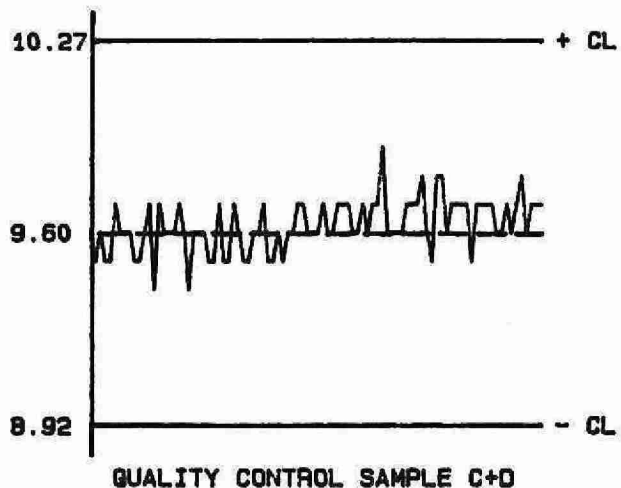
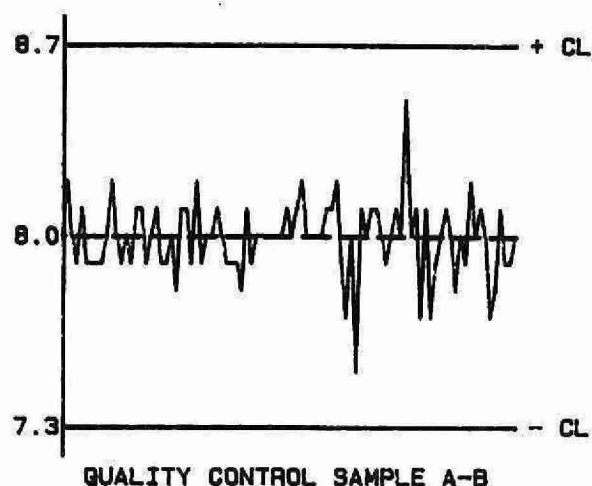
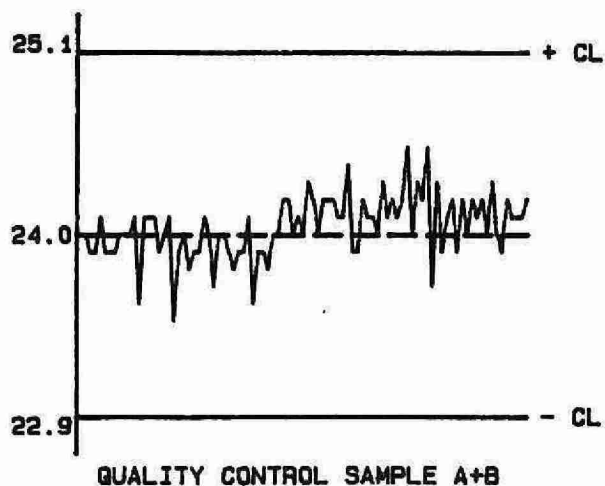
On any given day the calibration is accepted if the values obtained lie within the ranges:

22.9 to 25.1 for A+B
7.3 to 8.7 for A-B
8.82 to 10.27 for C+D
5.95 to 6.85 for C-D

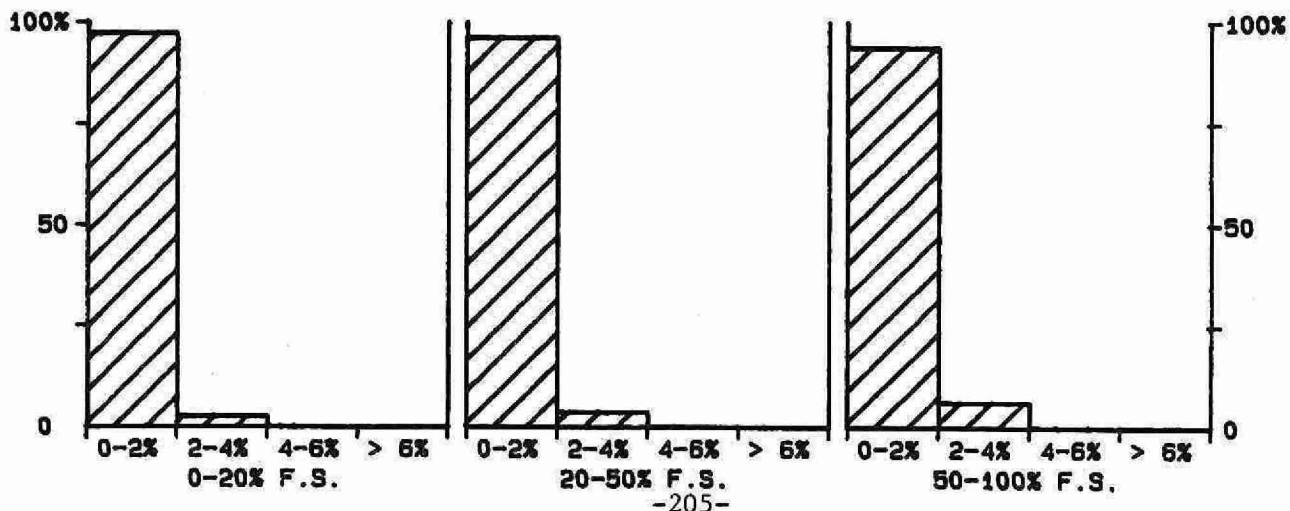
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	210	0.0 - 2.0	0.08	20.8
	30	2.0 - 5.0	0.13	3.8
	17	5.0 - 10.0	0.11	1.5
	7	10.0 - 20.0	0.15	1.0
	264	Overall	0.09	N/A

QUALITY CONTROL GRAPHS NITRATE+NITRITE-WFNO3 (MG/L AS N)

FROM: 01/03/88
TO: 15/12/88



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)



-205-

***** NITROGEN - NITRATE PLUS NITRITE *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 13/06/78
LIS Test Name Code	: NNOTFR	Units	: ug/L as N
Work Station Code	: DONUT	Unit Code	: 063807
Method Code	: 1525C2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation, and Soil Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: PET-500 ml Jars

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a sample. Nitrate is reduced to nitrite in alkaline media at 37°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl)ethylenediaminedihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.

Approximate absorbance : 0.4 at the full scale level.

N.B. Ammonia plus ammonium is determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules:

37°C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 5.0 cm. light path at 520 nm.

REPORTING:

Maximum Significant Figures: 3

Current W value: 2

T value: 10

CALIBRATION:

BL plus 8 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL plus 1 standard every 10 samples

NITRITE + NITRATE (DONUT)
QUALITY CONTROL DATA FROM 08/01/88 TO 30/12/88

Lab: Dorset

Analytical Range: - to 500 ug/l as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	53	375	373	-2	4.7
b :	53	125	125	0	3.5
a+b :	53	500	498	-2	6.9
a-b :	53	250	249	-1	4.6

s.d.(AB): Sw(within run): 3.3 S(between runs): 4.1 S/Sw: 1.27

On any given day the calibration is accepted if the values obtained lie within the ranges:

470 to 530 for A+B
 230 to 270 for A-B

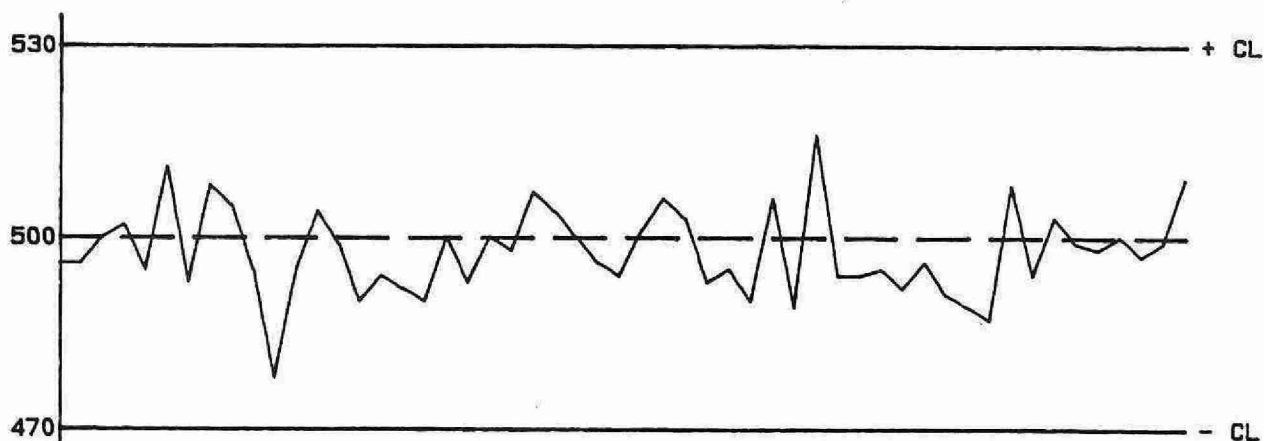
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	61	0 - 50	1.6	11.0
	23	50 - 100	2.6	3.4
	40	100 - 250	5.5	3.6
	15	250 - 500	6.9	2.0
	139	Overall	4.0	N/A

OTHER CHECKS:

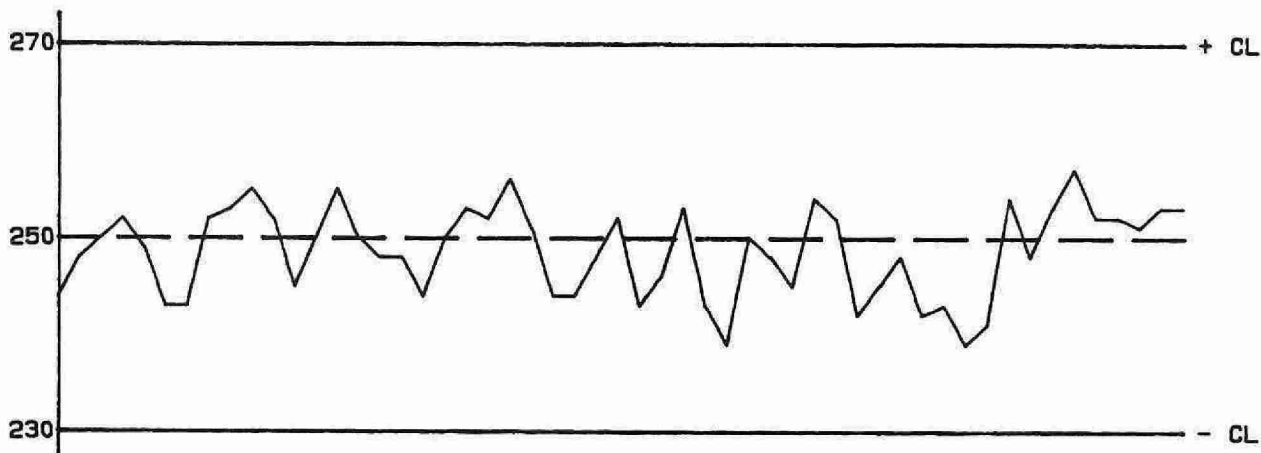
	Number of Data	Data Mean	Standard(1) Deviation
std. cal. :	53	167	22.9
Long Term Blank :	53	0	1.0

QUALITY CONTROL GRAPHS NITRITE + NITRATE (DONUT) (UG/L AS N)

FROM: 08/01/88
TO: 30/12/88

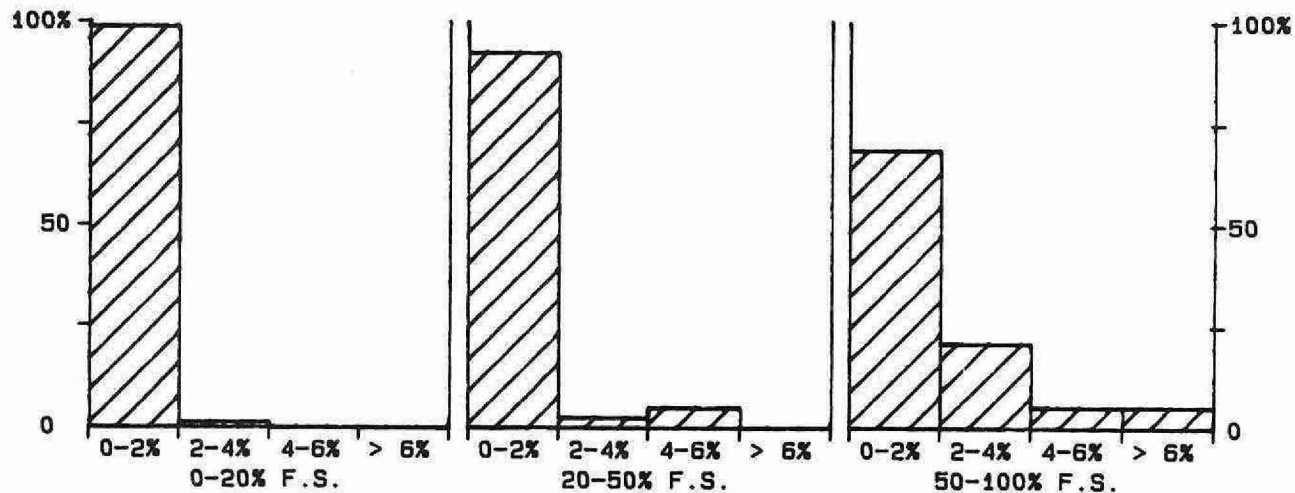


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-208-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 500 UG/L AS N

***** NITROGEN - NITRITE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO2FR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 102DC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrite is determined on the supernatant of a settled sample by formation of an azo dye using sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride.
Approximate absorbance: 0.6 at the full scale level.
N.B. Ammonia plus ammonium, nitrate plus nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 520 nm.
Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.001	T value: 0.005
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

MODIFICATIONS:

01/02/84 -Sample filtration was eliminated for all sample classes but Great Lakes (G).
15/05/84 -Microcomputer system was introduced. At this time the number of calibration standards was increased from 3 to 7, and the calibration technique was changed from linear interpolation to the use of a quadratic.
01/110/84 -Sample filtration was eliminated for Great Lakes (G) samples.
12/02/86 -HP9920 microcomputer introduced to replace Commodore PET.

NITROGEN-NITRITE-RNDNP-NO2
QUALITY CONTROL DATA FROM 02/02/88 TO 22/12/88

Lab: Colourimetry

Analytical Range: - to 0.250 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	133	0.160	0.160	-0.000	0.0016
b :	133	0.080	0.080	0.000	0.0009
a+b :	133	0.240	0.240	-0.000	0.0022
a-b :	133	0.080	0.080	-0.000	0.0013
c :	133	0.030	0.030	0.000	0.0009
d :	133	0.016	0.016	-0.000	0.0008
c+d :	133	0.096	0.096	-0.000	0.0015
c-d :	133	0.064	0.064	0.000	0.0008

s.d.(AB): Sw(within run): 0.0009 S(between runs): 0.0013 S/Sw: 1.41
s.d.(CD): Sw(within run): 0.0006 S(between runs): 0.0009 S/Sw: 1.51

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.231 to 0.249 for A+B
0.074 to 0.086 for A-B
0.091 to 0.100 for C+D
0.061 to 0.067 for C-D

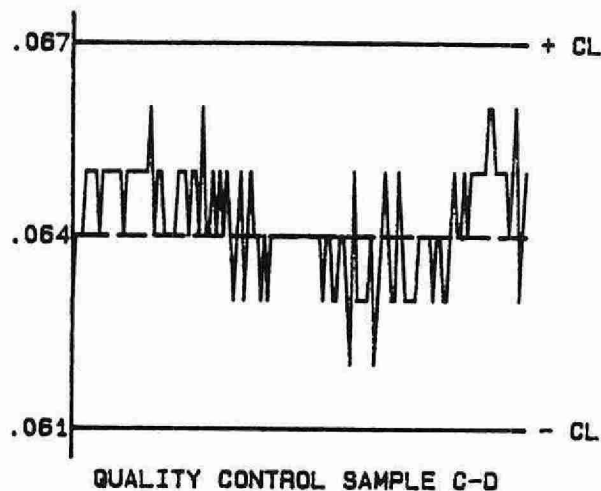
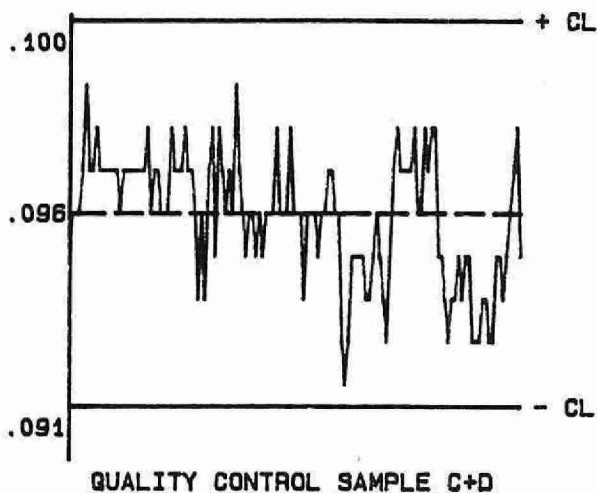
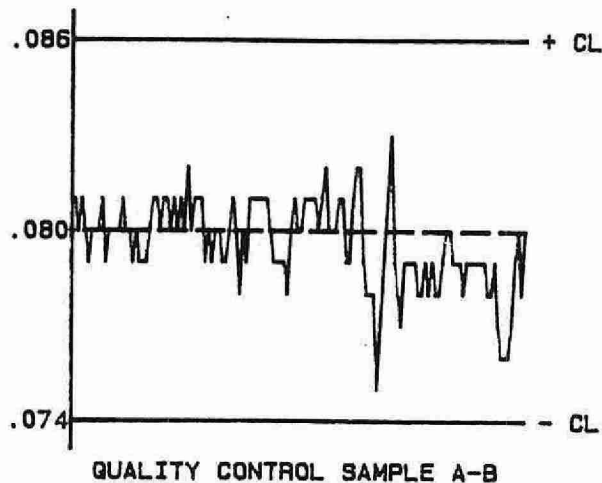
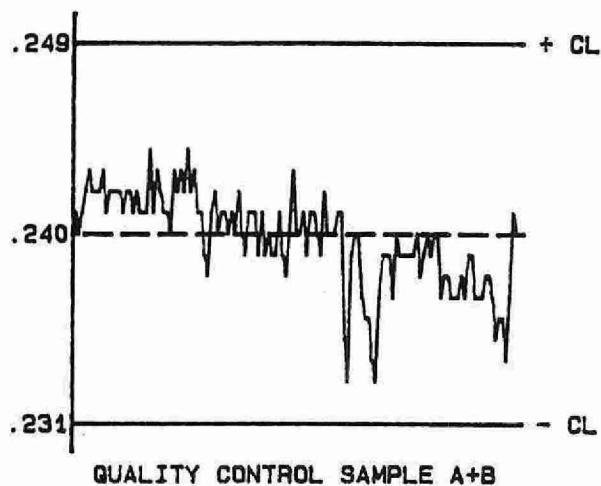
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	234	0.000 - 0.010	0.0013	30.5
	66	0.010 - 0.020	0.0018	13.1
	64	0.020 - 0.100	0.0020	4.5
	7	0.100 - 0.250	0.0022	1.7
	371	Overall	0.0016	N/A

OTHER CHECKS:

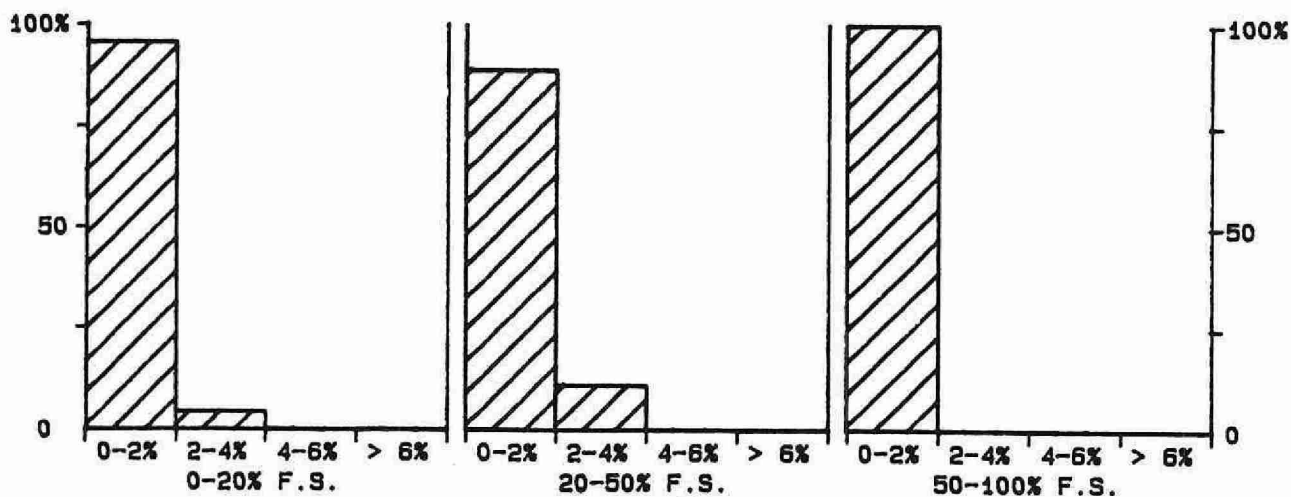
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	132	0.000	0.0007

QUALITY CONTROL GRAPHS NITROGEN-NITRITE-RNDNP-NO2 (MG/L AS N)

FROM: 02/02/88
TO: 22/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



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CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): .25 MG/L AS N

***** NITROGEN - NITRITE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO2FR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 102CC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters		

SAMPLING:

Quantity Required : 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Nitrite is determined on the supernatant of a settled sample by formation of an azo dye using sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride.
Approximate absorbance: 0.3 at the full scale level.
N.B. Ammonia plus ammonium, nitrate plus nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 520 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; standard every 20 samples

MODIFICATIONS:

18/06/86 -HP9920 microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to quadratic using 6 standards instead of 2.

NITROGEN-NITRITE-SDNP
QUALITY CONTROL DATA FROM 02/02/88 TO 29/12/88

Lab: Colourimetry

Analytical Range: - to 2.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
c :	138	0.800	0.798	-0.002	0.0079
d :	138	0.160	0.159	-0.001	0.0033
c+d :	138	0.960	0.957	-0.003	0.0090
c-d :	138	0.640	0.639	-0.001	0.0082

s.d.(CD): Sw(within run): 0.0058 S(between runs): 0.0061 S/Sw: 1.04

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.915 to 1.005 for C+D
0.610 to 0.670 for C-D

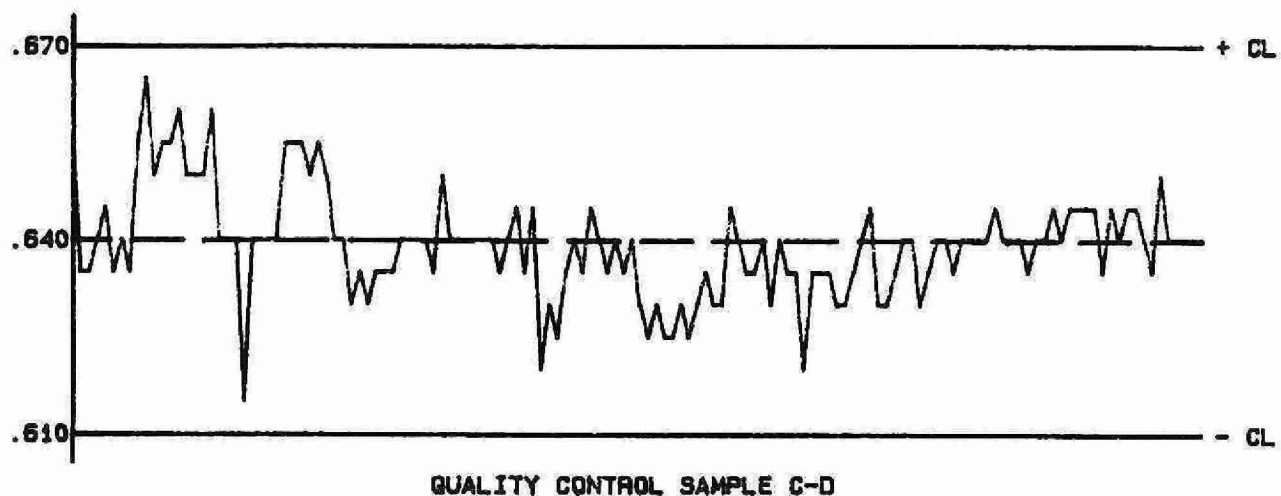
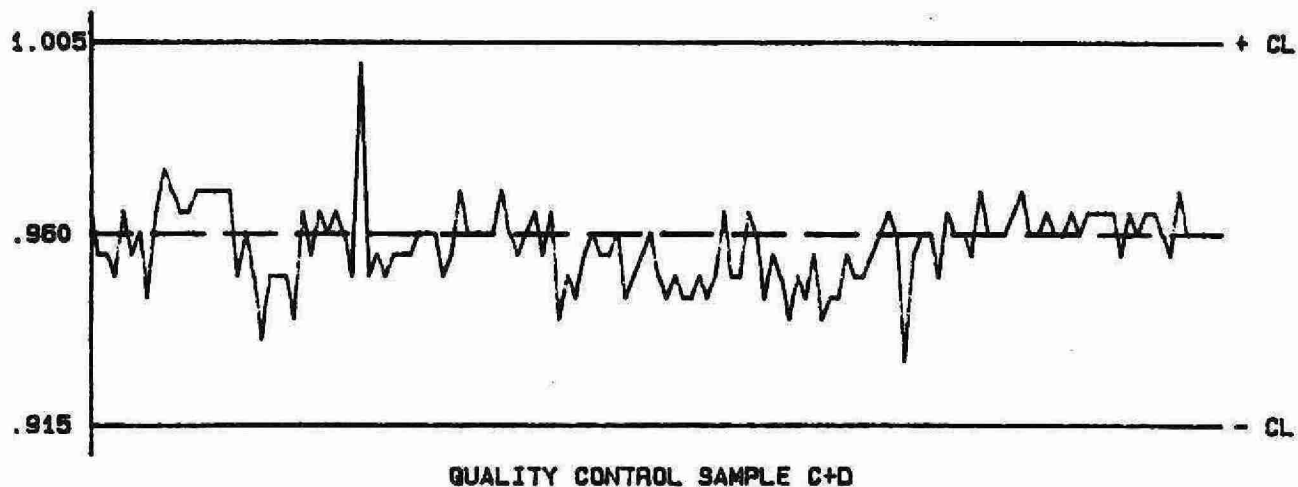
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	321	0.000 - 0.200	0.0050	15.8
	47	0.20 - 1.00	0.024	4.6
	19	1.00 - 2.00	0.027	1.8
	387	Overall	0.011	N/A

OTHER CHECKS:

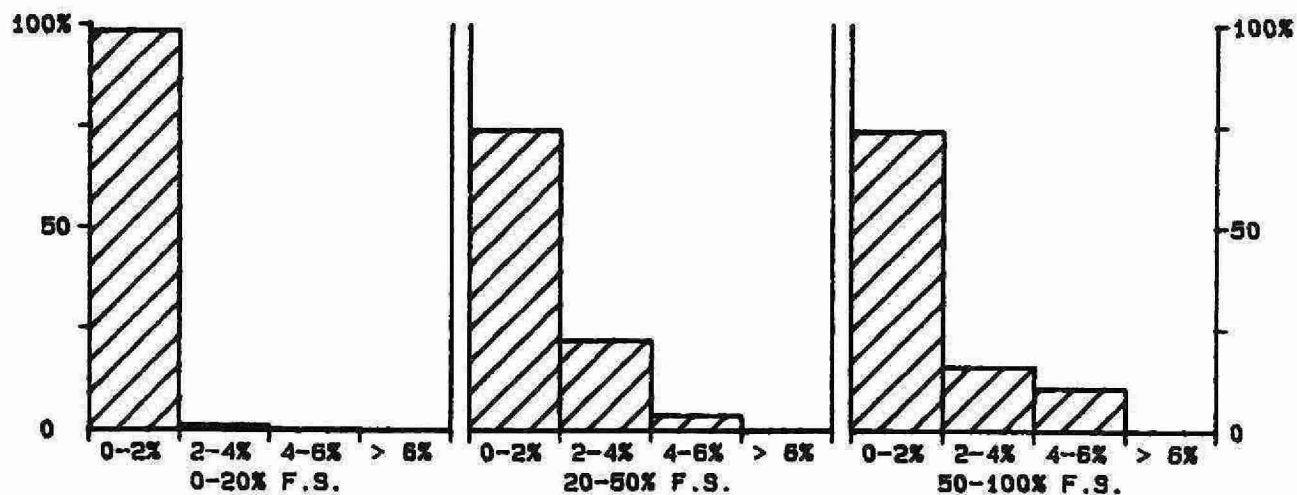
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	133	0.004	0.0044

QUALITY CONTROL GRAPHS NITROGEN-NITRITE-SDNP (MG/L AS N)

FROM: 02/02/88
TO: 29/12/88



— EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 MG/L AS N

***** NITROGEN - TOTAL KJELDAHL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: NNTKUR	Units	: mg/L as N
Work Station Code	: RTNP	Unit Code	: 064807
Method Code	: 004AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using two block digesters kept at 200°C and 360°C. The pH of the digestate is adjusted in-line in two stages and then ammonia is determined by formation of indophenol blue in a buffered system using nitroprusside as a catalyst.

Approximate absorbance: 0.3 at the full scale level.

N.B. Total phosphorus is determined simultaneously.

INSTRUMENTATION:

- Block digesters (2)
- Basic automated modular continuous flow system plus 1 module: 37°C bath (7.7 mL delay). Coulourimetric measurement is through a 5.0 cm. light path at 630 nm.
- Data capture, reduction, and processing via a multi-stage microcomputer system

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 6 undigested standards

CONTROLS:

Calibration : LTBL plus 2 undigested standards, e.g. QCA
Recovery : 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift : BL every 10 samples; undigested standard every 20 samples

MODIFICATIONS:

15/08/83 -Microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to the use of a quadratic.

26/02/86 -HP9920 microcomputer replace Commodore PET.

NITROGEN-TOTAL KJELDAHL-RTNP
QUALITY CONTROL DATA FROM 02/02/88 TO 30/12/88

Lab: Colourimetry

Analytical Range: - to 2.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	168	1.60	1.60	0.00	0.013
b :	168	0.80	0.80	-0.00	0.008
a+b :	168	2.40	2.40	-0.00	0.016
a-b :	168	0.80	0.80	0.00	0.014

s.d.(AB): Sw(within run): 0.010 S(between runs): 0.011 S/Sw: 1.09

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31 to 2.49 for A+B
0.74 to 0.86 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	167	1.40	1.37	0.040
r2 :	167	0.84	0.82	0.026
r3 :	166	0.28	0.27	0.013

DUPLICATES:

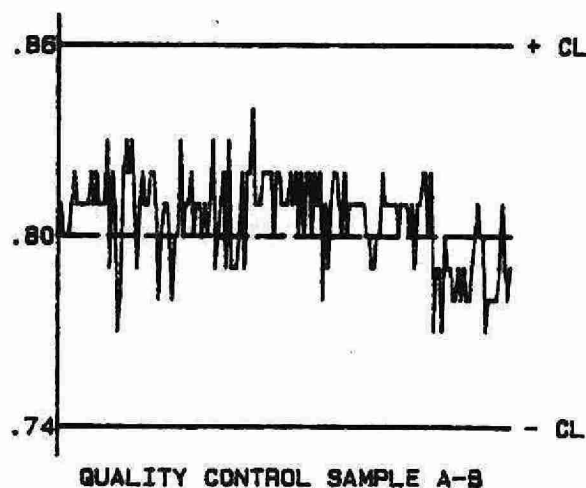
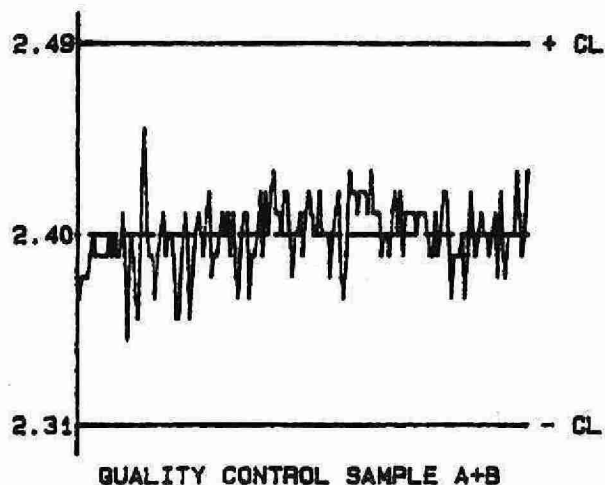
	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
69		0.00 - 0.20	0.012	9.2
255		0.20 - 0.50	0.021	6.5
111		0.50 - 1.00	0.035	4.9
26		1.00 - 2.00	0.036	2.8
461		Overall	0.025	N/A

OTHER CHECKS:

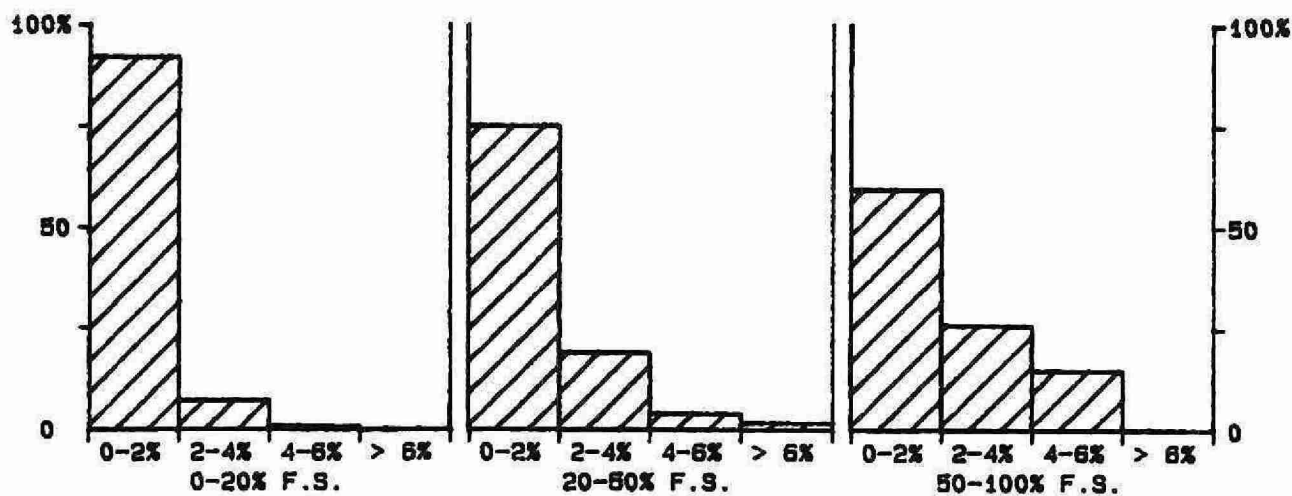
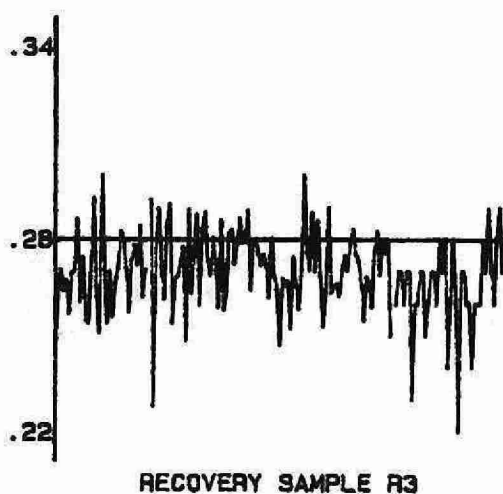
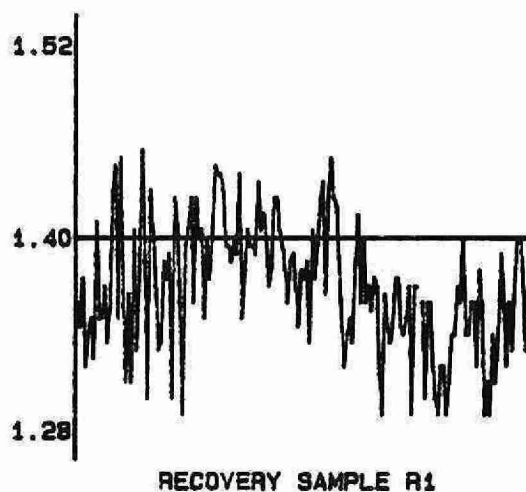
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	168	0.00	0.010
Digested Blank :	168	0.02	0.012

QUALITY CONTROL GRAPHS NITROGEN-TOTAL KJELDAHL-RTNP (MG/L AS N)

FROM: 02/02/88
TO: 30/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 MG/L AS N

***** NITROGEN - TOTAL KJELDAHL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: NNTKUR	Units	: mg/L as N
Work Station Code	: STKNP	Unit Code	: 064807
Method Code	: 004BC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Domestic Waters, Effluents, Leachates		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using two block digesters kept at 200°C and 360°C. The pH of the digestate is adjusted in-line in two stages and then ammonia is determined by formation of indophenol blue in a buffered system using nitroprusside as a catalyst.

Approximate absorbance: 1.1 at the full scale level.

N.B. Total phosphorus is determined simultaneously.

INSTRUMENTATION:

- Block digesters (2)
- Basic automated modular continuous flow system plus 1 module: 37°C bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 630 nm. Data capture, reduction and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 6 undigested standards

CONTROLS:

Calibration : LTBL plus 4 undigested standards, e.g. QCA
Recovery : 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift : BL every 10 samples; undigested standard every 20 samples

MODIFICATIONS:

01/10/85 -Higher range selected, full scale changed from 10 to 25 mg/L as N. New calibration controls added.

18/06/86 -HP9920 microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to quadratic using 6 standards instead of 2.

NITROGEN-TOTAL KJELDAHL-STKNP
QUALITY CONTROL DATA FROM 02/02/88 TO 29/12/88

Lab: Colourimetry

Analytical Range: - to 25.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	158	20.0	20.0	0.0	0.12
b :	158	10.0	10.0	0.0	0.07
a+b :	158	30.0	30.1	0.1	0.16
a-b :	158	10.0	10.0	0.0	0.11
c :	158	10.00	10.04	0.04	0.078
d :	158	2.00	2.00	-0.00	0.040
c+d :	158	12.00	12.04	0.04	0.100
c-d :	158	8.00	8.04	0.04	0.073

s.d.(AB): SW(within run): 0.08 S(between runs): 0.10 S/Sw: 1.26
s.d.(CD): SW(within run): 0.052 S(between runs): 0.062 S/Sw: 1.20

On any given day the calibration is accepted if the values obtained lie within the ranges:

28.9 to 31.1 for A+B
9.3 to 10.7 for A-B
11.55 to 12.45 for C+D
7.70 to 8.30 for C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	154	17.5	17.4	0.33
r2 :	157	10.50	10.43	0.220
r3 :	156	3.50	3.46	0.087

DUPLICATES:

	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
219		0.00 - 1.00	0.040	8.7
64		1.00 - 2.00	0.115	8.1
57		2.00 - 5.00	0.217	6.8
46		5.0 - 10.0	0.20	2.7
74		10.0 - 25.0	0.31	2.0
460		Overall	0.17	N/A

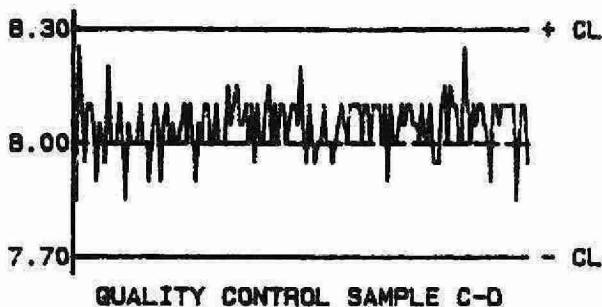
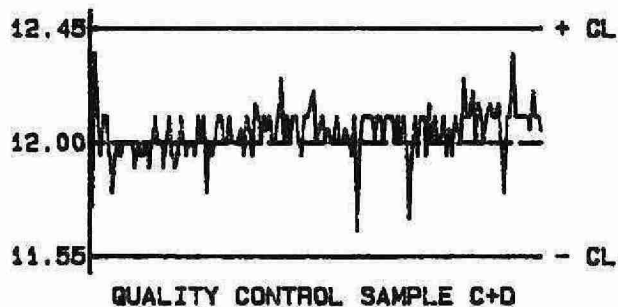
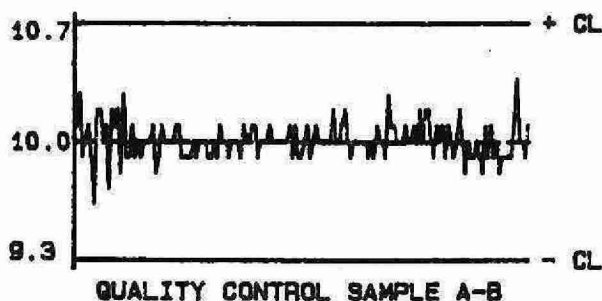
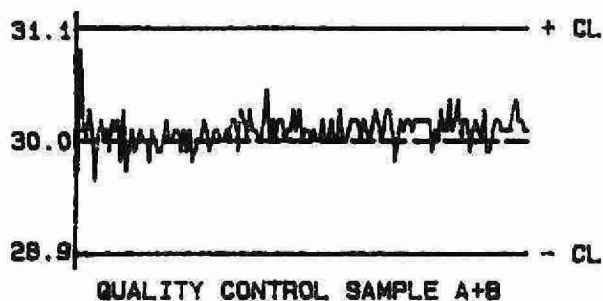
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	158	0.01	0.041
Digested Blank :	158	0.05	0.095

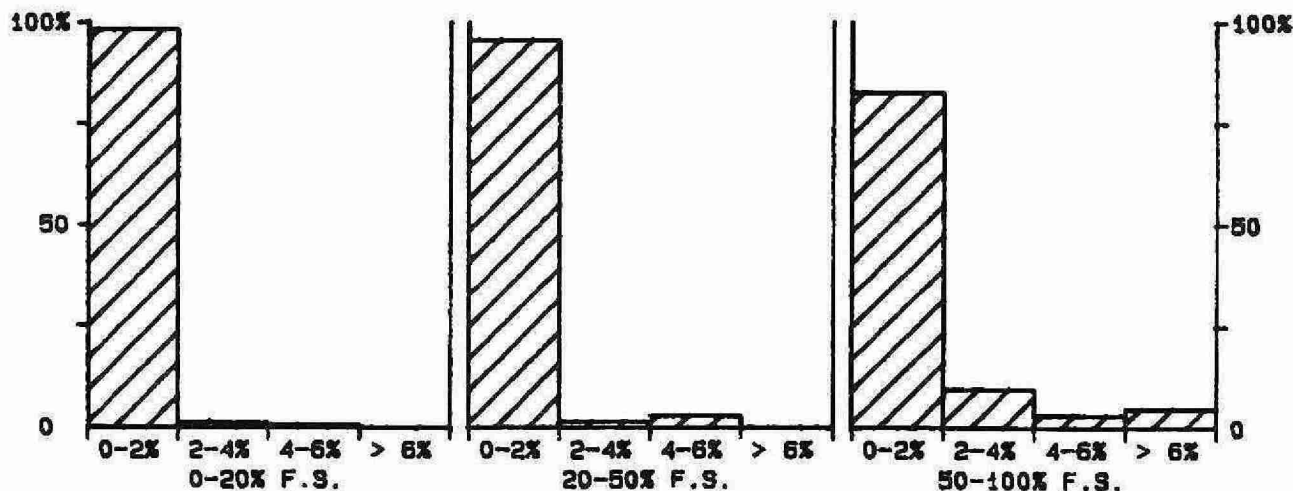
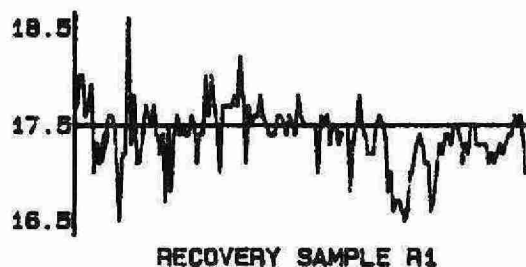
QUALITY CONTROL GRAPHS

NITROGEN-TOTAL KJELDAHL-STKNP (MG/L AS N)

FROM: 02/02/88
TO: 29/12/88



— EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 25 MG/L AS N

***** OXYGEN - BIOCHEMICAL DEMAND *****

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced	: Before '61
LIS Test Name Code	: BOD5	Units	: mg/L as O
Work Station Code	: SBBOD5	Unit Code	: 064808
Method Code	: 001AI2	Supervisor	: P. Campbell
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Leachates		

SAMPLING:

Quantity Required : 400 mL
Container : Glass or plastic

SAMPLE PREPARATION:

If necessary sample pH is adjusted to neutral and chlorine is removed by reaction with sodium sulphite.

ANALYTICAL PROCEDURE:

Using dissolved oxygen (DO) analyses, samples are measured for oxygen depletion before and after a five day period (BOD5) of storage in the dark at 20°C. If necessary, dilutions are made with aerated, nutrient-enriched water to obtain a 50-75% oxygen depletion. If the sample has undergone any of the sample preparation steps listed above or if the sample is an industrial waste, a sewage seed is added. For such samples calculation of an appropriate seed correction is required.

INSTRUMENTATION:

- Weston and Stack Oxygen analyzer with DO probe equipped with stirrer and fitted with a Teflon membrane of 0.5 mil thickness which is permeable to oxygen.
- Titration equipment for Winkler analysis of dissolved oxygen.
- Incubator (19-21°C); BOD bottles (300 mL)

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1.0

CALIBRATION (DO):

Blank is a sulphite solution (negligible DO) and the standard is air-saturated distilled, deionized water. The DO content of the latter is read from a table after measuring its temperature and the barometric pressure in the laboratory.

CONTROLS:

Calibration (DO) : 2 QC solutions of distilled water which have been partially stripped of DO by flushing with nitrogen. These "solutions", of different but unknown DO, are analyzed with the Oxygen Analyzer and by the Winkler titration procedure. The difference between the values for the two analytical methods is utilized as a slope control for the DO Analyzer.
Recovery (BOD5) : 3 Recovery standards prepared from a combination of Glucose and

Glutamic Acid e.g. R1; the expected BOD5 is 67% of the oxygen requirement for complete oxidation.

Drift : Air saturated distilled water after every 24 samples.

MODIFICATIONS:

01/05/81 -Quality control program for DO was expanded, and the use of standard 300 mL BOD bottles was restored.

35/06/85 -Digital burette (readability to 0.01 mL) replaced glass burette.

03/03/86 -Microcomputer system interfaced to oxygen meter for workstation control and direct computer input.

OXYGEN DEMAND-BIOCHEMICAL (SBODS)
QUALITY CONTROL DATA FROM 07/01/88 TO 30/12/88

Lab: Solids and BOD

Analytical Range: - to 400 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	88	0.00	0.03	0.03	0.149
b :	89	0.00	0.05	0.05	0.108

On any given day the calibration is accepted if the values obtained for A and B lie within the range:

-0.25 to 0.25

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	90	2.17	2.18	0.142
r2 :	90	4.34	4.23	0.224
r3 :	85	6.52	6.25	0.373

DUPLICATES:

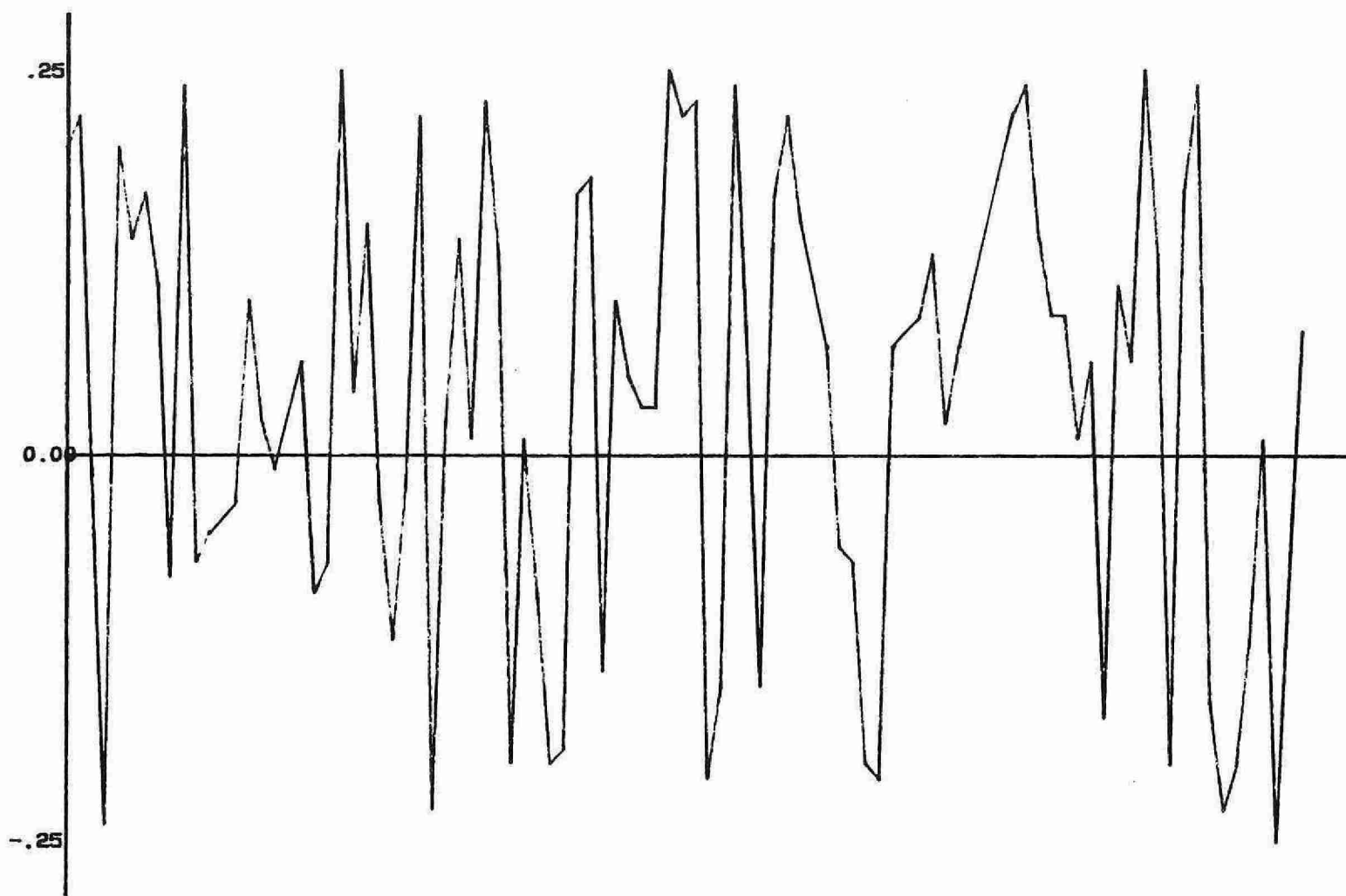
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
24	0.0 - 5.0	0.27	11.8
24	5 - 20	0.8	6.8
25	20 - 50	2.2	6.2
46	50 - 100	2.8	3.9
61	100 - 400	5.0	3.1
180	Overall	3.3	N/A

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
5 day BOD Blank :	90	0.19	0.080
5 day BOD Blank :	91	0.23	0.093

QUALITY CONTROL GRAPH
OXYGEN DEMAND-BIOCHEMICAL- SBOD5 (MG/L AS O)

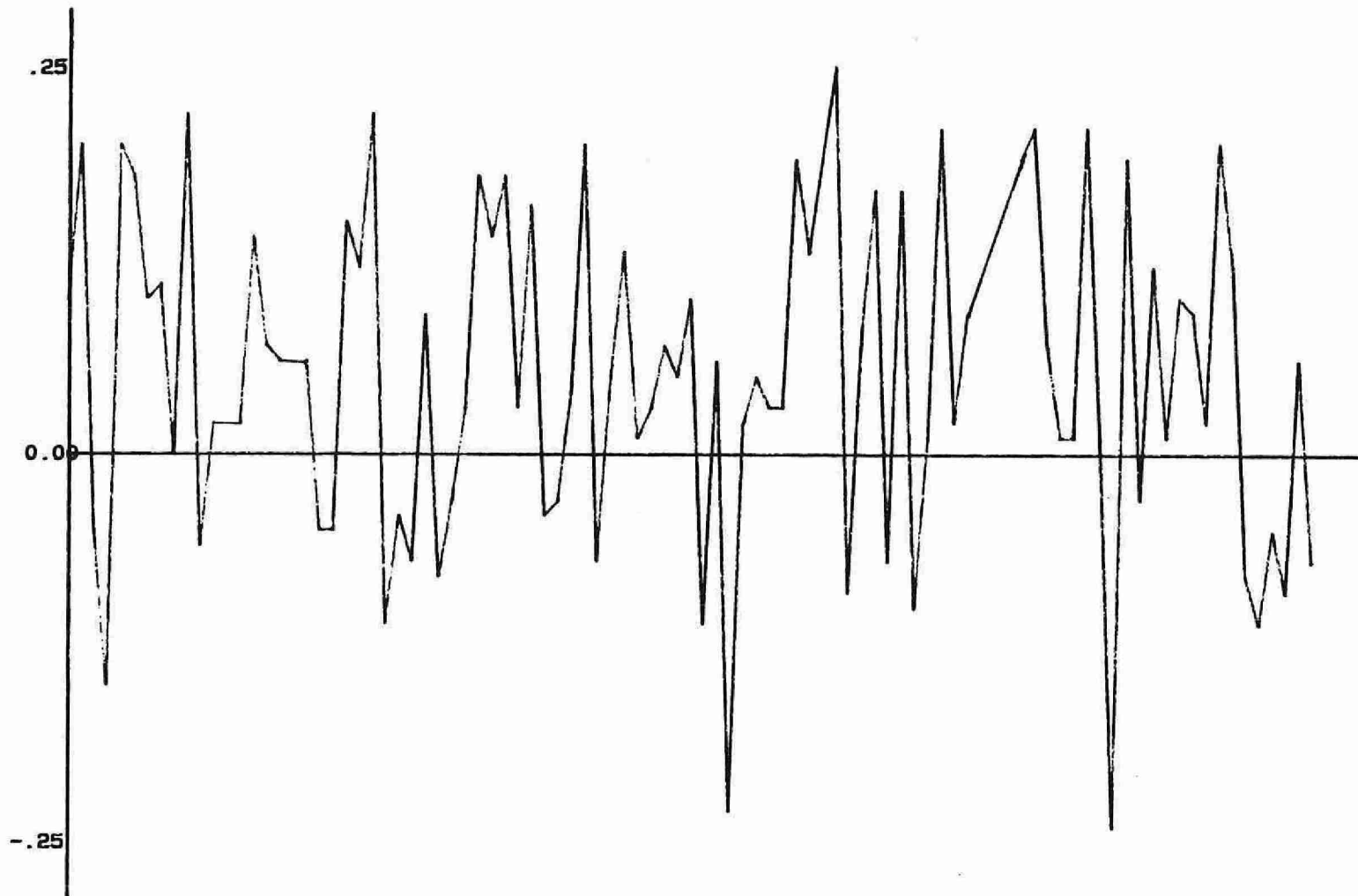
FROM: 07/01/88
TO: 30/12/88



QUALITY CONTROL A

QUALITY CONTROL GRAPH
OXYGEN DEMAND-BIOCHEMICAL- SBOD5 (MG/L AS O)

FROM: 07/01/88
TO: 30/12/88



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QUALITY CONTROL B

***** OXYGEN -CHEMICAL DEMAND *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/07/82
LIS Test Name Code	: COD, CODF	Units	: mg/L as O
Work Station Code	: RCOD	Unit Code	: 064808
Method Code	: 5251C2, 101BT6	Supervisor	: M. Rawlings
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents		

SAMPLING:

Quantity Required : 25 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are mixed with an acidified potassium dichromate solution which contains mercuric sulphate to suppress chloride interference. After adding concentrated sulphuric acid containing silver sulphate as a catalyst, the mixture is digested in a mechanical-convection oven for 3 hours at 150 C. Analysis is completed by automated colourimetric measurement of trivalent chromium.

Approximate absorbance: 0.05 at the full scale level.

INSTRUMENTATION:

-Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 600 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

3 digested BL plus 3 digested standards

CONTROLS:

Calibration : 2 digested standards, e.g. QCA
Drift : Undigested BL every 10 samples; standard plus BL at end of run
Interference : Digested standard (40 mg/L as O) spiked with 50 mg/L Cl confirms suppression of chloride interference.

MODIFICATIONS:

30/06/82 -Manual COD procedure described in HAMES was discontinued. Development report on the current procedure, described above, is available on request.

NOTES:

In order to retard sample decomposition the first reagent (acidified dichromate) is added as soon as possible at the laboratory. Analysis is scheduled for completion within the week.

OXYGEN DEMAND - CHEMICAL - RCOD
QUALITY CONTROL DATA FROM 08/01/88 TO 21/12/88

Lab: Colourimetry

Analytical Range: - to 100. mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	56	40.0	39.9	-0.1	1.22
b :	56	10.0	10.0	0.0	1.04
a+b :	56	50.0	49.8	-0.2	1.83
a-b :	56	30.0	29.9	-0.1	1.34

s.d.(AB): Sw(within run): 0.95 S(between runs): 1.13 S/Sw: 1.20

On any given day the calibration is accepted if the values obtained lie within the ranges:

45.5 to 54.5 for A+B
 27.0 to 33.0 for A-B

DUPLICATES:

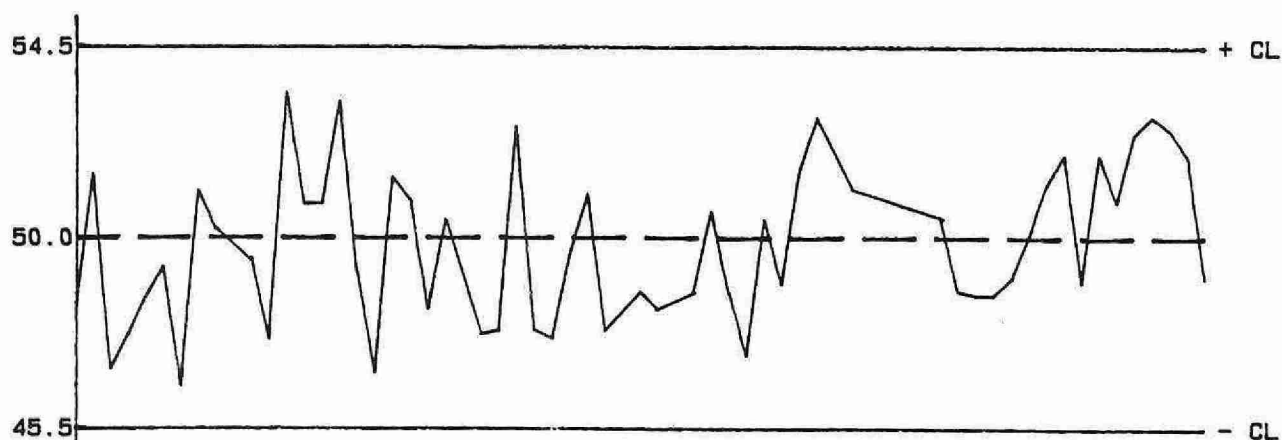
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
19	0 - 10	1.9	32.6
56	10. - 20.	1.70	11.4
36	20. - 50.	2.30	8.4
1	50. - 100.	N/A	N/A
112	Overall	1.94	N/A

OTHER CHECKS:

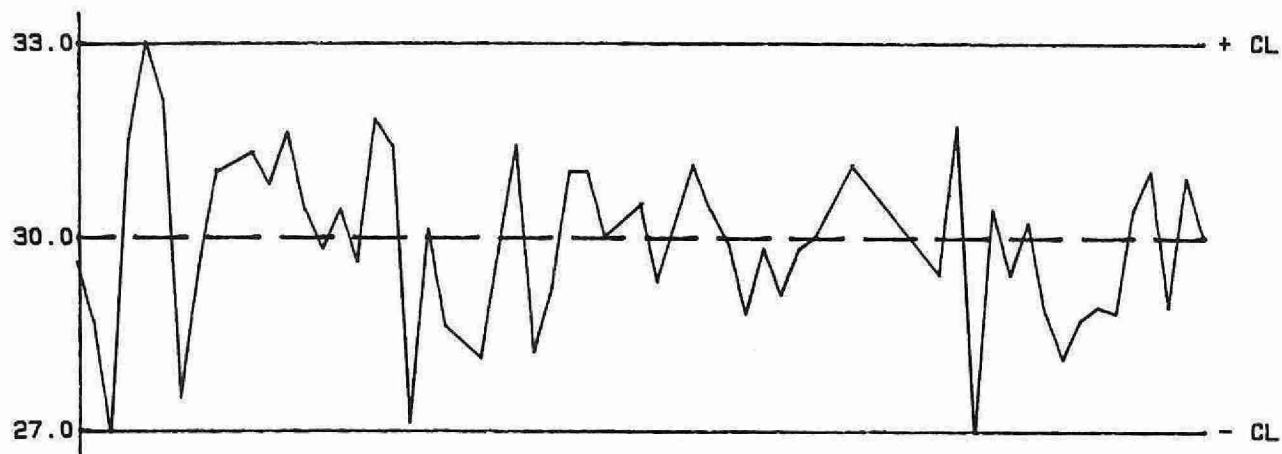
	Number of Data	Data Mean	Standard(1) Deviation
Chloride Check :	55	38	2.3

QUALITY CONTROL GRAPHS OXYGEN DEMAND - CHEMICAL - COD (MG/L AS O)

FROM: 08/01/88
TO: 21/12/88

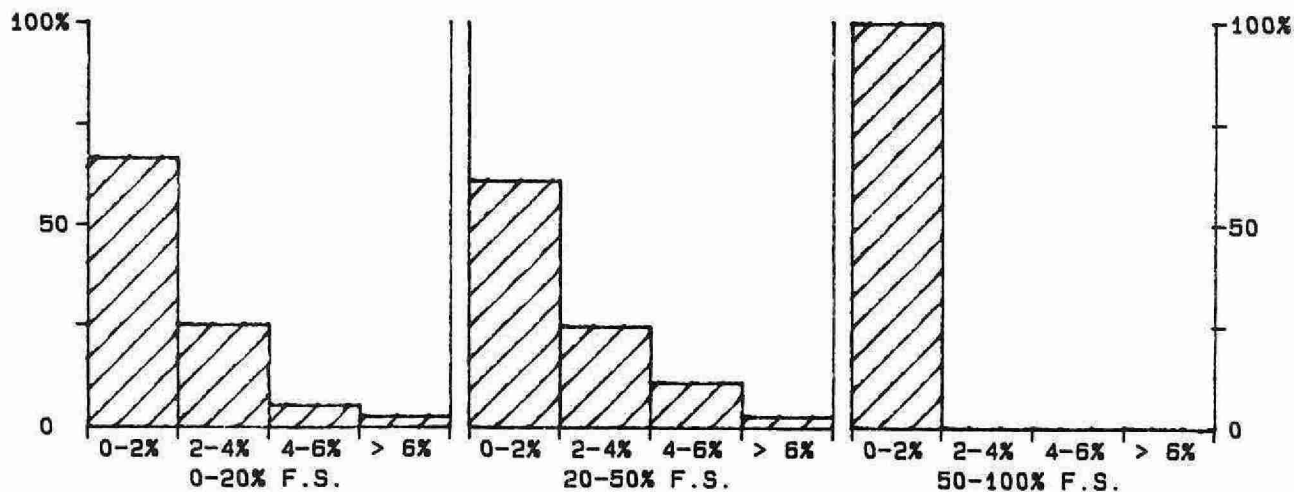


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)



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CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 MG/L AS O

***** OXYGEN -CHEMICAL DEMAND *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/07/82
LIS Test Name Code	: COD	Units	: mg/L as O
Work Station Code	: SBCOD	Unit Code	: 064808
Method Code	: 002AC0	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Domestic Waters, Leachates, Effluents		

SAMPLING:

Quantity Required : 25 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are mixed with an acidified potassium dichromate solution which contains mercuric sulphate to suppress chloride interference. After adding concentrated sulphuric acid containing silver sulphate as a catalyst, the mixture is digested in a mechanical-convection oven for 3 hours at 150°C. Analysis is completed by automated colourimetric measurement of trivalent chromium.

Approximate absorbance: 0.6 at the full scale level.

INSTRUMENTATION:

-Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 600 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

2 digested BL plus 4 digested standards

CONTROLS:

Calibration : 2 digested standards, e.g. QCA
Recovery : 2 digested standards, e.g. R1
Drift : Undigested BL every 10 samples; standard plus BL at end of run
Interference : Digested standard (50 mg/L as O) spiked to 900 mg/L Cl confirms suppression of chloride interference.

MODIFICATIONS:

30/06/82 -Manual COD procedure described in HAMES was discontinued. Development report on the current procedure, described above, is available on request.

NOTES:

In order to retard sample decomposition the first reagent (acidified dichromate) is added as soon as possible at the laboratory. Analysis is scheduled for completion within the week.

OXYGEN DEMAND-CHEMICAL-SBCOD
QUALITY CONTROL DATA FROM 07/01/88 TO 16/12/88

Lab: Colourimetry

Analytical Range: - to 500 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	55	400	398	-2	6.4
b :	55	100	100	0	4.7
a+b :	55	500	498	-2	8.6
a-b :	55	300	297	-3	7.1

s.d.(AB): Sw(within run): 5.0 S(between runs): 5.6 S/Sw: 1.12

On any given day the calibration is accepted if the values obtained lie within the ranges:

478 to 522 for A+B
 285 to 315 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	57	390	379	6.5
r2 :	57	98	97	4.8

DUPLICATES:

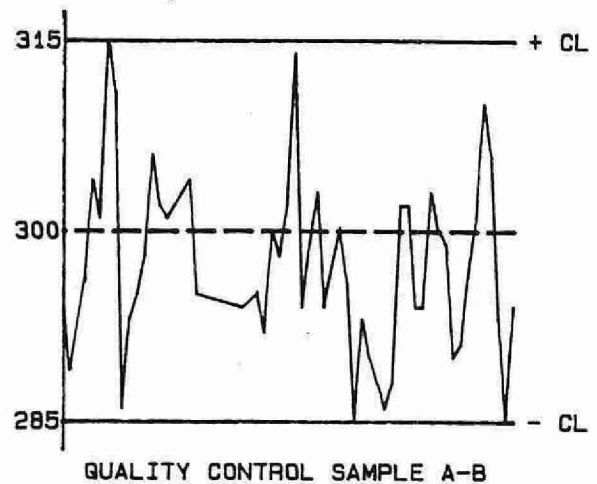
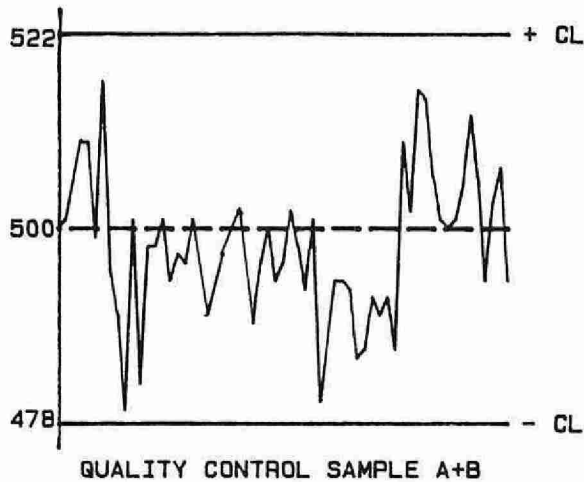
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
90	0 - 50	5.4	31.9
16	50 - 100	7.7	10.5
13	100 - 250	9.1	6.4
4	250 - 500	32.9	9.8
123	Overall	8.6	N/A

OTHER CHECKS:

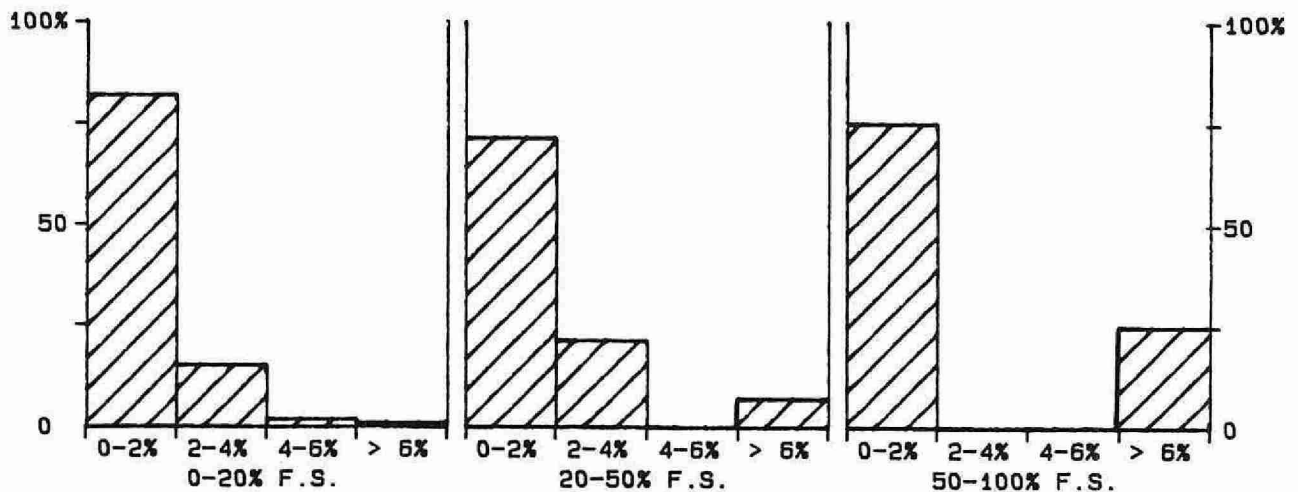
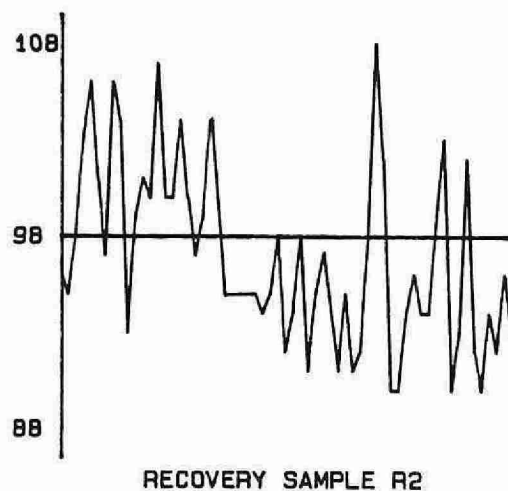
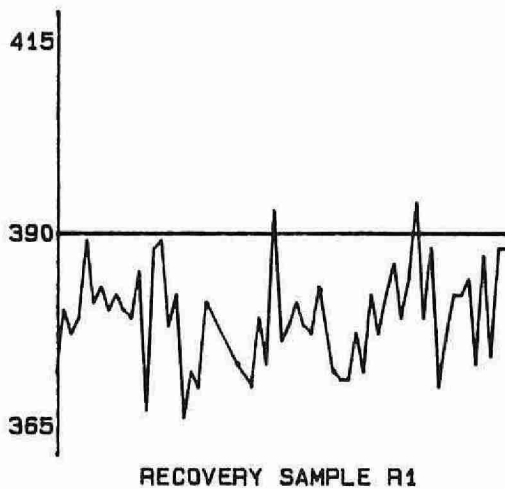
	Number of Data	Data Mean	Standard(1) Deviation
Chloride Check :	54	54	9.3

QUALITY CONTROL GRAPHS OXYGEN DEMAND-CHEMICAL-SBCOD (MG/L AS O)

FROM: 07/01/88
TO: 16/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



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CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 500 MG/L AS O

***** PH *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/01/76
LIS Test Name Code	: PH	Units	: dimensionless
Work Station Code	: DOCOP	Unit Code	: nil
Method Code	: 0903PH	Supervisor	: F. Tomassini
Sample Type/Matrix	: Lakes		

SAMPLING:

Quantity Required : 100 mL
Container : BOD bottle filled to the brim; screw caps
with cone-shaped liners.

ANALYTICAL PROCEDURE:

PH is measured directly on a stirred sample (50 mL) at room temperature by a pH meter. Stirring rate, beaker size, degree of electrode immersion and room temperature range are uniform for all samples and standards.

INSTRUMENTATION:

Digital pH meter, stirrer, combined glass electrode.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration : BL plus 2 standards, e.g. QCA, QCB
Drift : 2 standard buffers - 2 times daily

PH - DOCOP
QUALITY CONTROL DATA FROM 05/01/88 TO 29/12/88

Lab: Dorset

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	204	6.86	6.86	0.00	0.016
b :	204	4.00	3.95	-0.05	0.045
a+b :	204	10.86	10.82	-0.04	0.056
a-b :	204	2.86	2.91	0.05	0.037

s.d.(AB): Sw(within run): 0.026 S(between runs): 0.034 S/Sw: 1.29

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.65 to 11.07 for A+B
2.72 to 3.00 for A-B

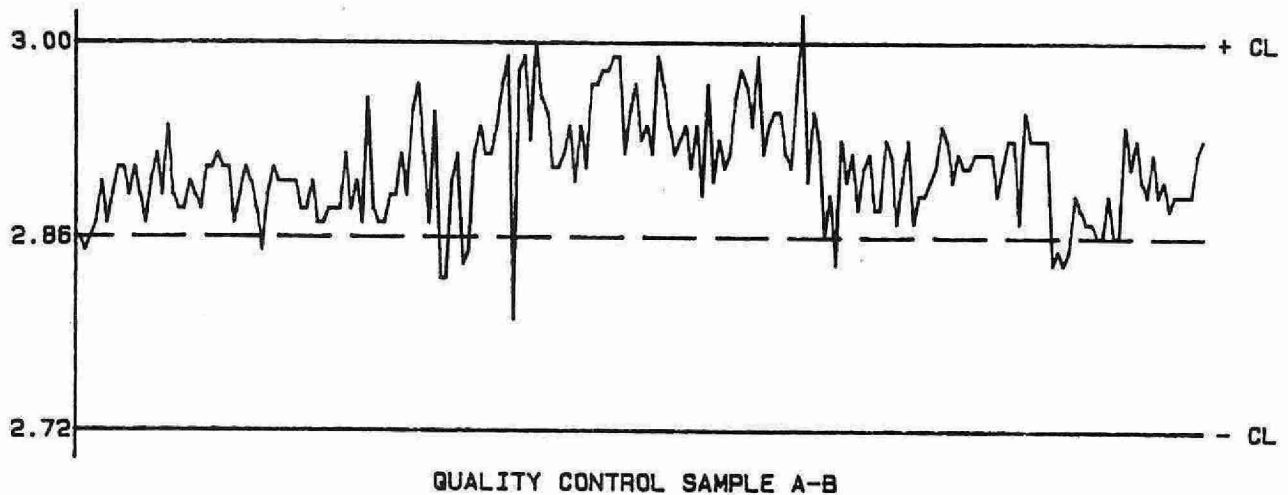
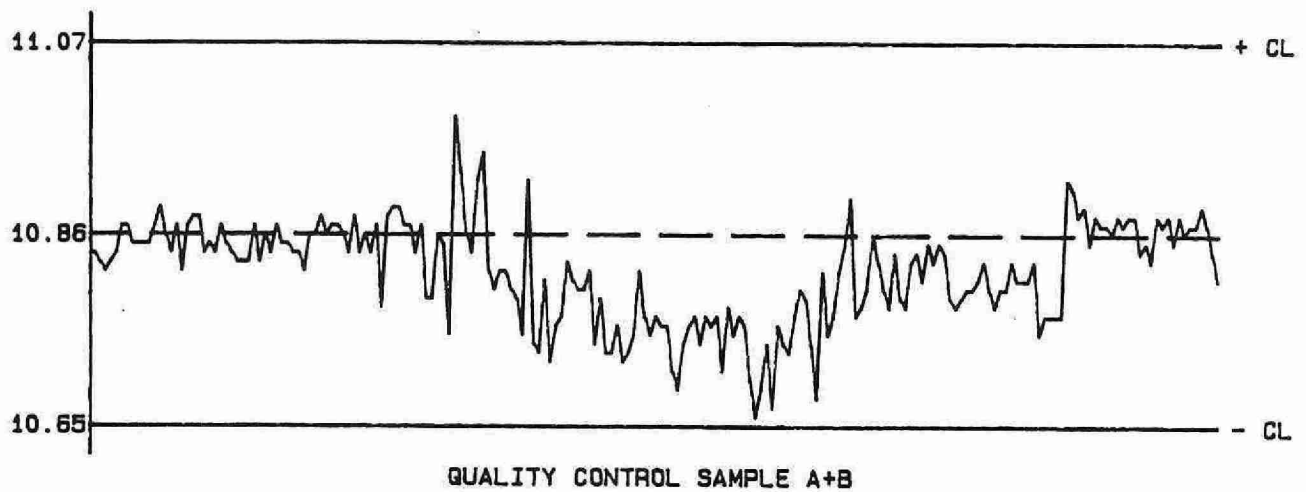
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	0	0.00 - 4.00	N/A	N/A
	52	4.00 - 5.50	0.029	0.5
	386	5.50 - 7.00	0.053	0.8
	40	7.00 - 8.50	0.041	0.5
	0	8.50 - 14.00	N/A	N/A
	478	Overall	0.050	N/A

QUALITY CONTROL GRAPHS

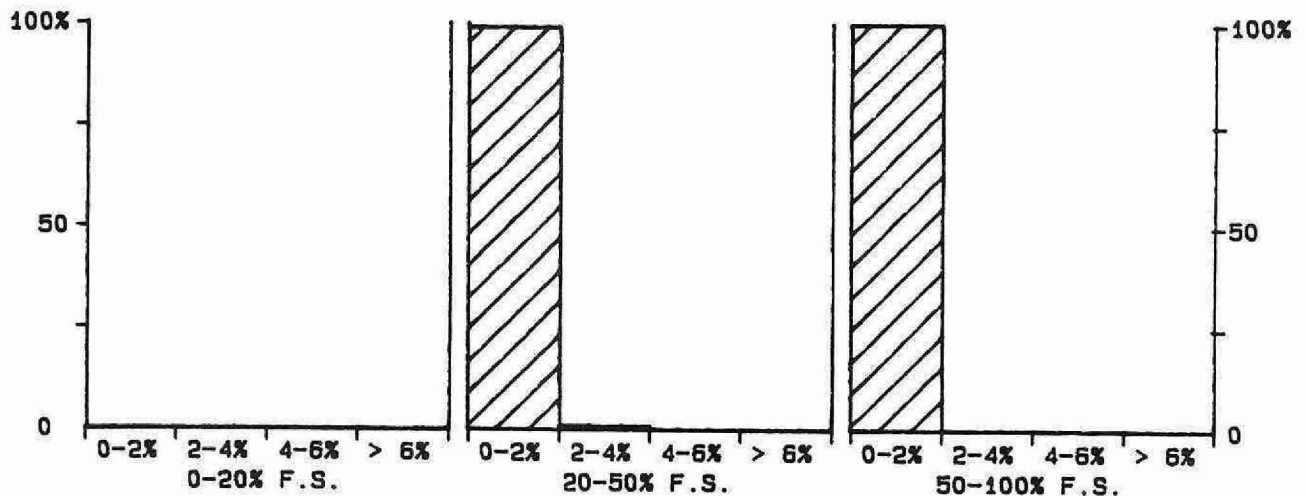
PH - DOCOP (DIMENSIONLESS)

FROM: 05/01/88

TO: 29/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



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CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14 DIMENSIONLESS

*** PH ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/01/76
LIS Test Name Code	: PH	Units	: dimensionless
Work Station Code	: DOT	Unit Code	: nil
Method Code	: 0902PH	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation, and Groundwater		

SAMPLING:

Quantity Required : 150 mL
Container : 250 ml Amber polyethylene or BOD bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

PH is measured directly on a stirred sample (100 mL) at room temperature by a pH meter. Stirring rate, beaker size, degree of electrode immersion and room temperature range are uniform for all samples and standards.
N.B. Alkalinity (Gran) was performed simultaneously.

INSTRUMENTATION:

Digital pH meter, stirrer, combined glass electrode.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration : BL plus 2 standards, e.g. QCA, QCB
Drift : 2 standard buffers - 2 times daily

PH - DOT
QUALITY CONTROL DATA FROM 20/01/88 TO 22/12/88

Lab: Dorset

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	114	6.86	6.86	0.00	0.013
b :	114	4.00	3.98	-0.02	0.028
a+b :	114	10.86	10.84	-0.02	0.028
a-b :	114	2.86	2.88	0.02	0.034

s.d.(AB): Sw(within run): 0.024 S(between runs): 0.022 S/Sw: 0.91

On any given day the calibration is accepted if the values obtained lie within the ranges:

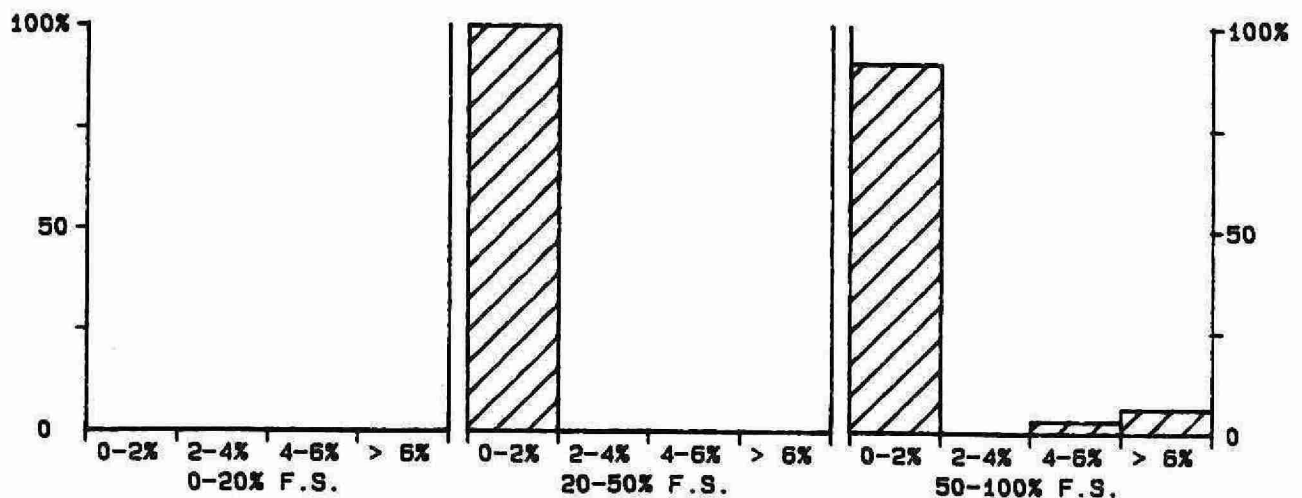
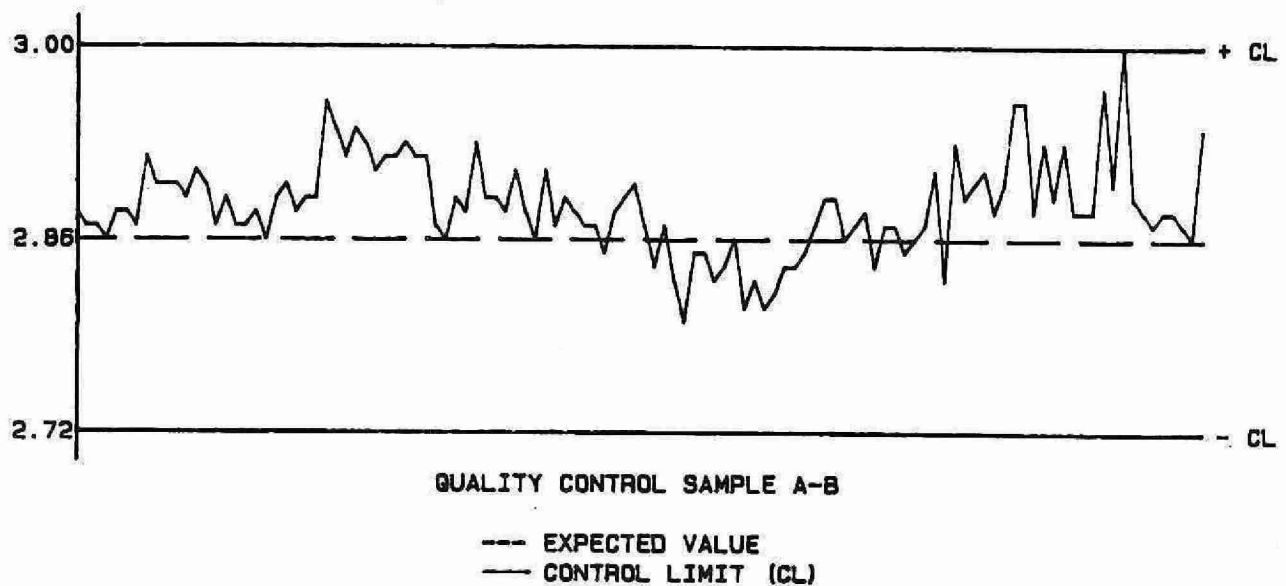
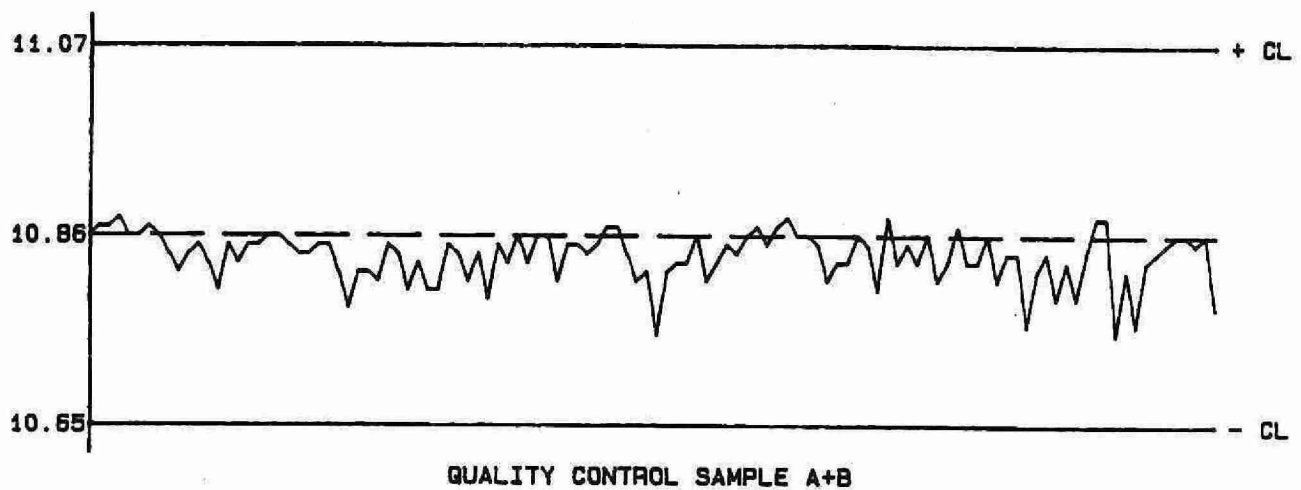
10.65 to 11.07 for A+B
2.72 to 3.00 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
0	0.00 - 4.00	N/A	N/A
69	4.00 - 5.50	0.011	0.2
212	5.50 - 7.00	0.019	0.3
31	7.00 - 8.50	0.206	2.8
2	8.50 - 14.00	0.071	0.6
314	Overall	0.067	N/A

QUALITY CONTROL GRAPHS PH - DOT (DIMENSIONLESS)

FROM: 20/01/88
TO: 22/12/88



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CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14 DIMENSIONLESS

*** PH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/05/79
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: PHACD	Unit Code	: nil
Method Code	: 002AI1	Supervisor	: F. Lo
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 15 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards.

N.B. Total fixed endpoint acidity and Gran acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA

MODIFICATIONS:

01/04/82 -Sample volume was decreased from 100.0 to 10.0 mL.

01/05/83 -System was fully automated by introduction of a sampler, and an automated device for washing the electrode between analyses.

30/05/86 -Direct Computer Input (DCI) to the Laboratory Information System (LIS) was introduced.

PH - ACIDITY
QUALITY CONTROL DATA FROM 11/01/88 TO 26/07/88

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	60	6.86	6.87	0.01	0.010
b :	60	4.01	4.01	-0.00	0.008
a+b :	60	10.87	10.87	0.00	0.014
a-b :	60	2.85	2.86	0.01	0.011

s.d.(AB): Sw(within run): 0.008 S(between runs): 0.009 S/Sw: 1.16

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.76 to 10.97 for A+B
 2.78 to 2.92 for A-B

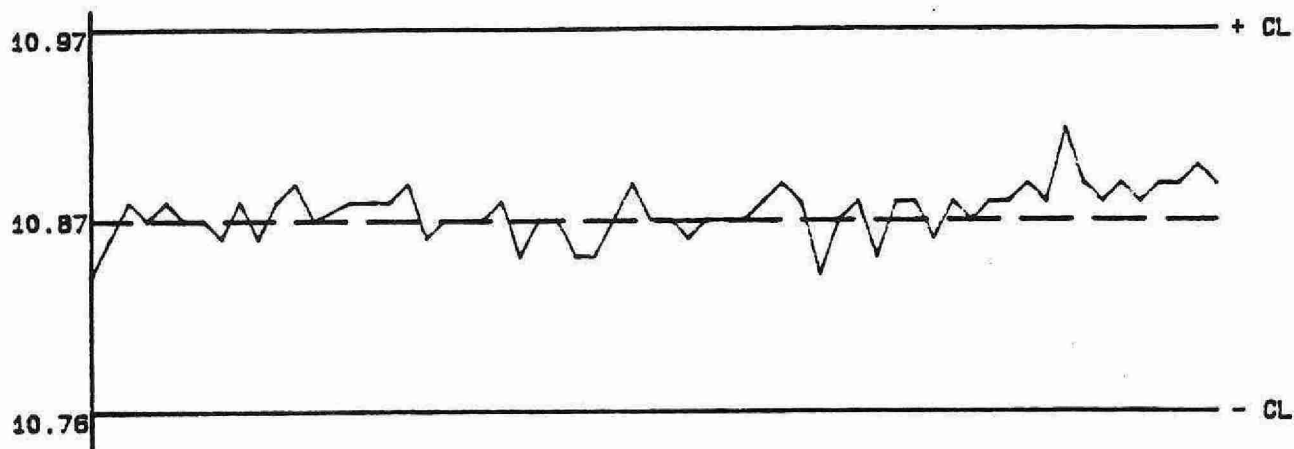
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
0	0.00 - 3.00	N/A	N/A
5	3.00 - 4.00	0.044	1.1
85	4.00 - 5.00	0.034	0.7
17	5.00 - 7.00	0.114	1.9
3	7.00 - 14.00	0.074	0.9
110	Overall	0.056	N/A

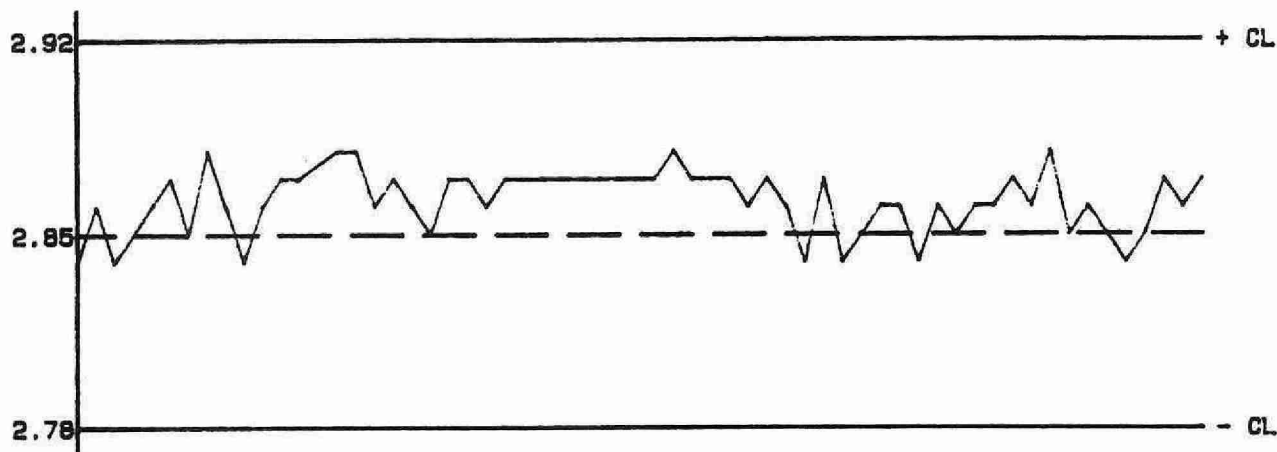
QUALITY CONTROL GRAPHS

PH - ACIDITY (DIMENSIONLESS)

FROM: 11/01/88
TO: 26/07/88

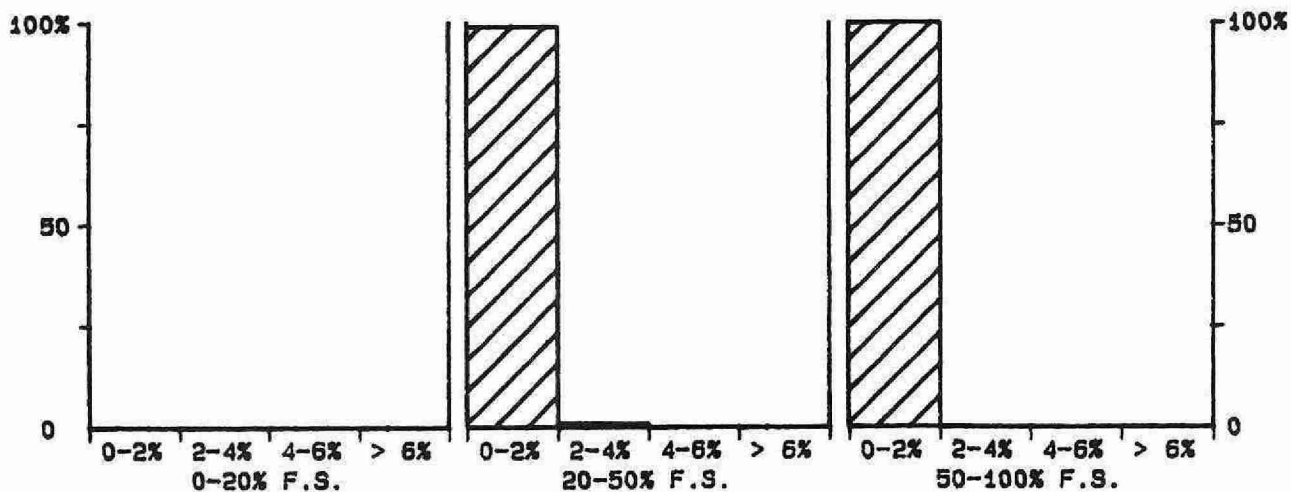


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14 DIMENSIONLESS

PH - ACIDITY
QUALITY CONTROL DATA FROM 28/07/88 TO 22/12/88

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	50	4.45	4.46	0.01	0.032
b :	50	3.75	3.75	-0.00	0.029
a+b :	50	8.20	8.21	0.01	0.051
a-b :	50	0.70	0.71	0.01	0.035

s.d.(AB): Sw(within run): 0.025 S(between runs): 0.031 S/Sw: 1.23

On any given day the calibration is accepted if the values obtained lie within the ranges:

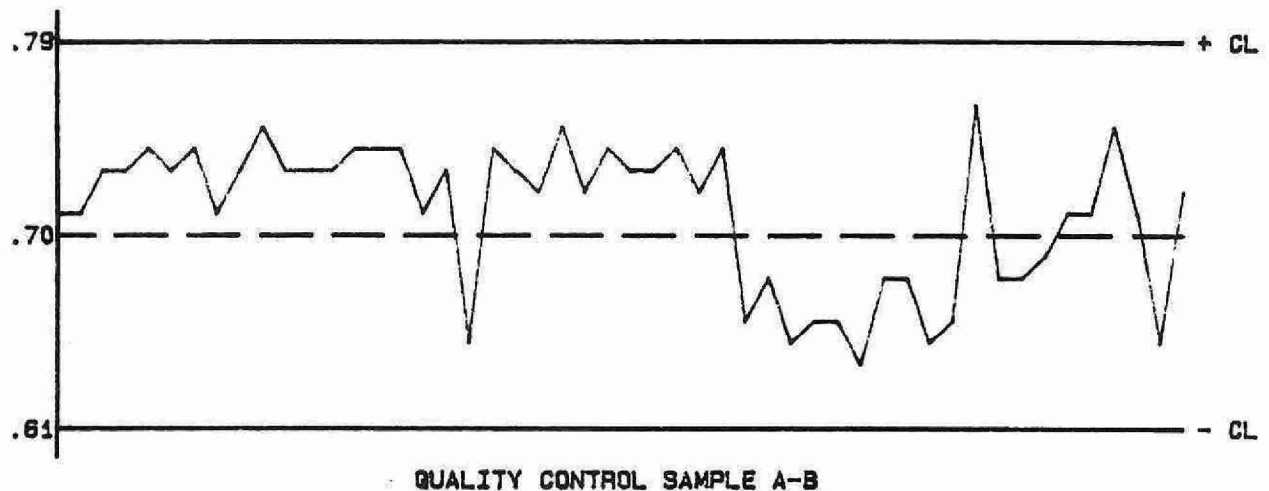
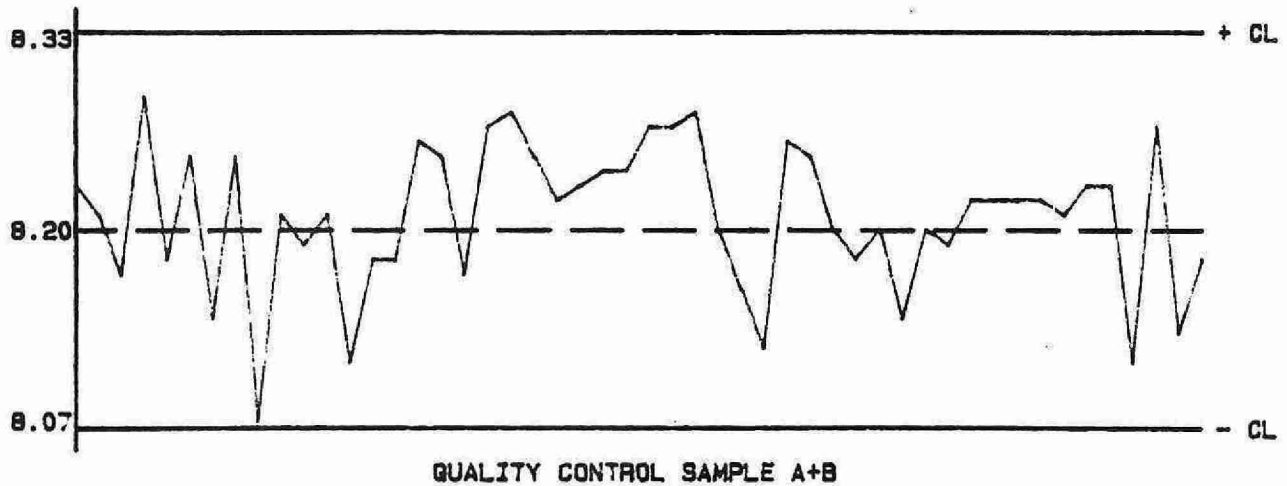
8.07 to 8.33 for A+B
0.61 to 0.79 for A-B

DUPLICATES:

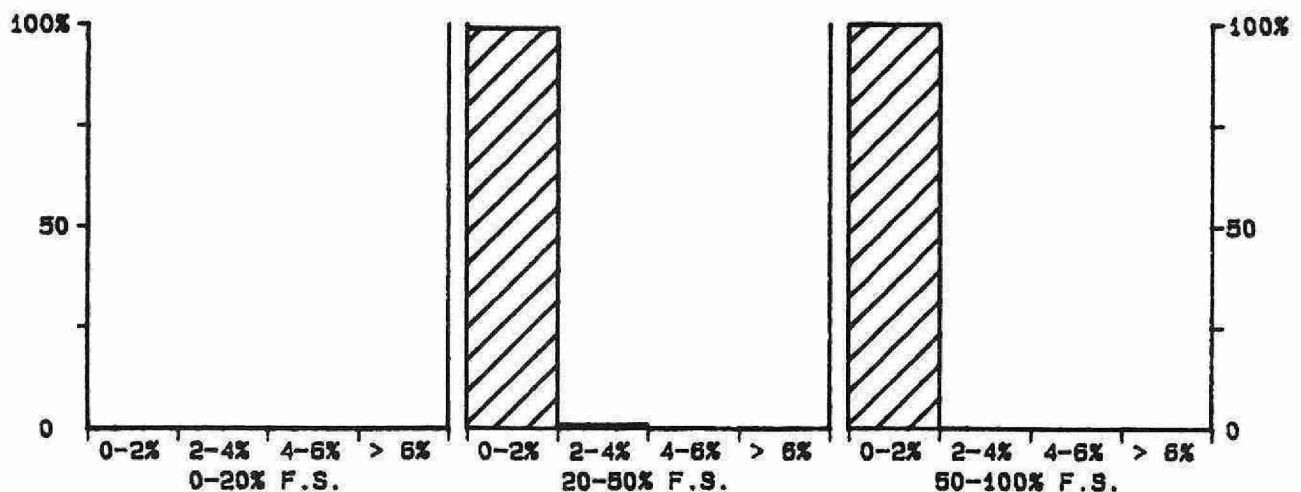
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
0	0.00 - 3.00	N/A	N/A
12	3.00 - 4.00	0.032	0.8
71	4.00 - 5.00	0.025	0.5
17	5.00 - 7.00	0.076	1.3
7	7.00 - 14.00	0.069	0.9
107	Overall	0.042	N/A

QUALITY CONTROL GRAPHS PH - ACIDITY (DIMENSIONLESS)

FROM: 28/07/88
TO: 22/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14 DIMENSIONLESS

***** PH *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: RATS	Unit Code	: nil
Method Code	: 003AI2	Supervisor	: F. Lo
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

PH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards.

N.B. Gran Alkalinity, total fixed endpoint alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range 4 to 7

CONTROLS:

Calibration : 2 "standards", e.g. QCA
Drift : In run standards throughout the run (diluted tap water 20% V/V)

MODIFICATIONS:

02/03/84 -QC program was expanded to include pH and total fixed endpoint alkalinity; preparation and storage of QC solutions was modified.

16/03/84 -Use of 4 oz. polyethylene bottles plus screw caps with cone-shaped liners was recommended for sampling.

09/05/85 -RATS - River Automated Titration System - designed for the determination of conductivity, pH, alkalinity-total fixed endpoint and alkalinity-Gran. The system is microcomputer controlled with data reduction and direct computer input (DCI) capabilities.

28/07/88 -Introduced new standardization procedure with buffers 9.18 and 4.008, and Q.C. standards at pH 7.41 and 4.45.

PH-RIVER TITRATION-RATS
QUALITY CONTROL DATA FROM 07/01/88 TO 29/07/88

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	79	4.45	4.46	0.01	0.020
b :	79	3.75	3.76	0.01	0.020
a+b :	79	8.20	8.22	0.02	0.029
a-b :	79	0.70	0.70	0.00	0.027

s.d.(AB): Sw(within run): 0.019 S(between runs): 0.020 S/Sw: 1.05

On any given day the calibration is accepted if the values obtained lie within the ranges:

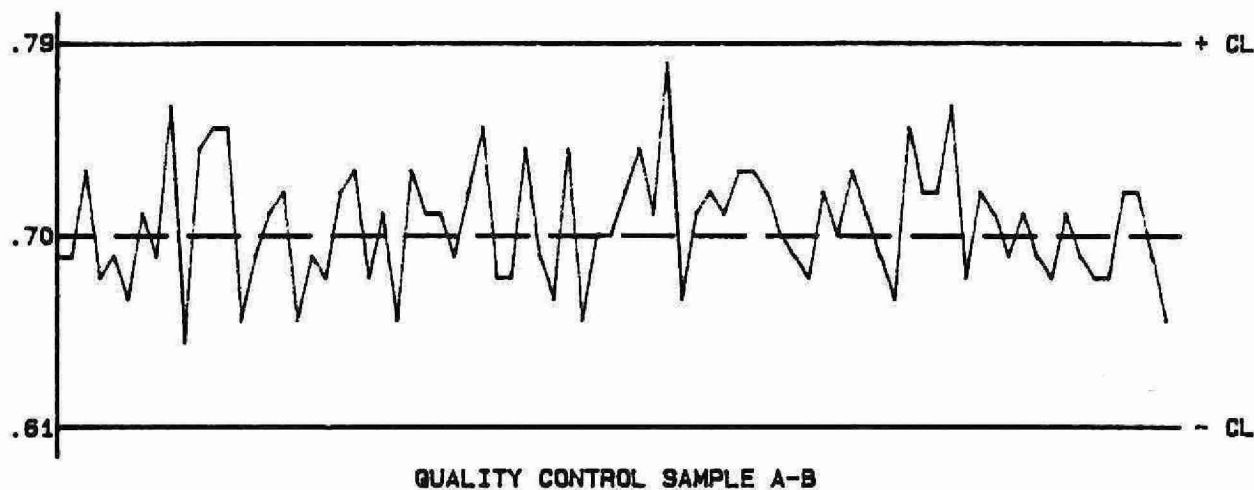
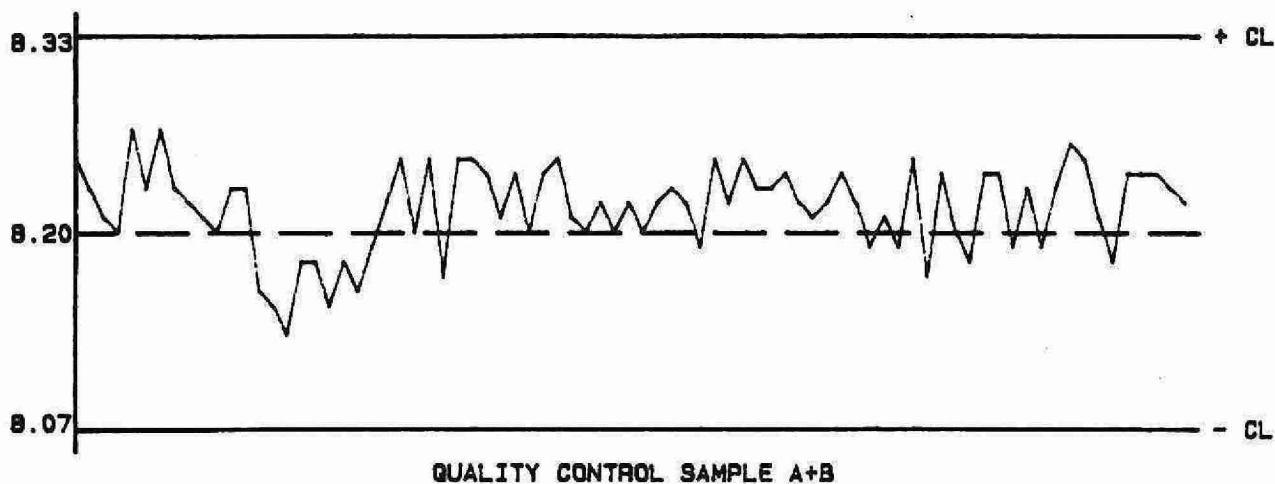
8.07 to 8.33 for A+B
0.61 to 0.79 for A-B

DUPLICATES:

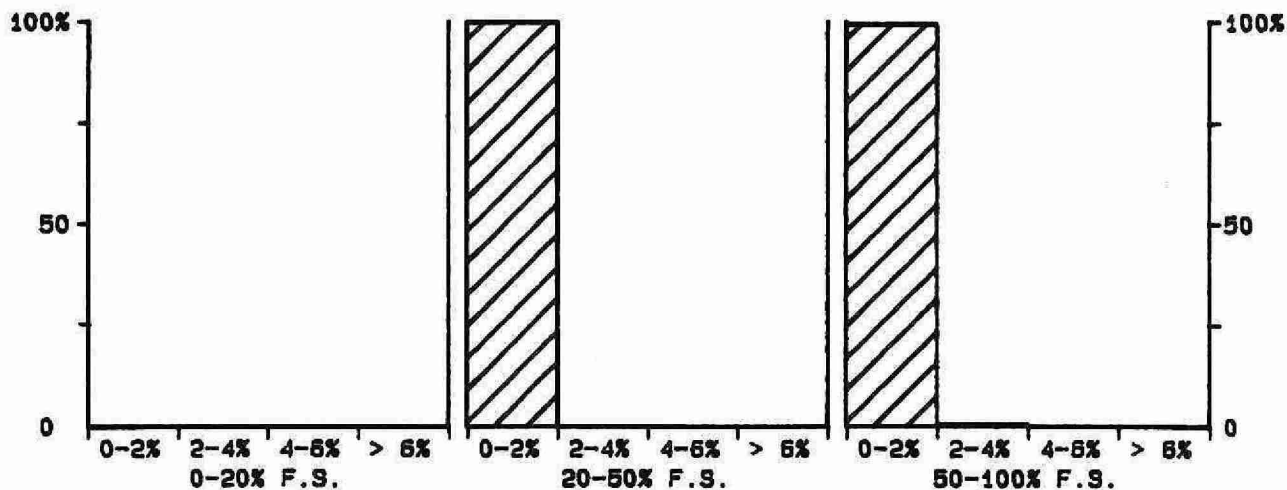
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.00 - 5.00	N/A	N/A
3	5.00 - 6.00	0.121	2.0
30	6.00 - 7.00	0.070	1.0
163	7.00 - 9.00	0.068	0.8
2	9.00 - 14.00	0.081	0.8
199	Overall	0.069	N/A

QUALITY CONTROL GRAPHS PH-RIVER TITRATION-RATS (DIMENSIONLESS)

FROM: 07/01/88
TO: 29/07/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14 DIMENSIONLESS
-245-

PH - RIVER TITRATION
QUALITY CONTROL DATA FROM 02/08/88 TO 16/12/88

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	49	7.41	7.45	0.04	0.023
b :	49	4.45	4.47	0.02	0.045
a+b :	49	11.86	11.92	0.06	0.046
a-b :	49	2.96	2.97	0.01	0.055

s.d.(AB): Sw(within run): 0.039 S(between runs): 0.036 S/Sw: 0.92

On any given day the calibration is accepted if the values obtained lie within the ranges:

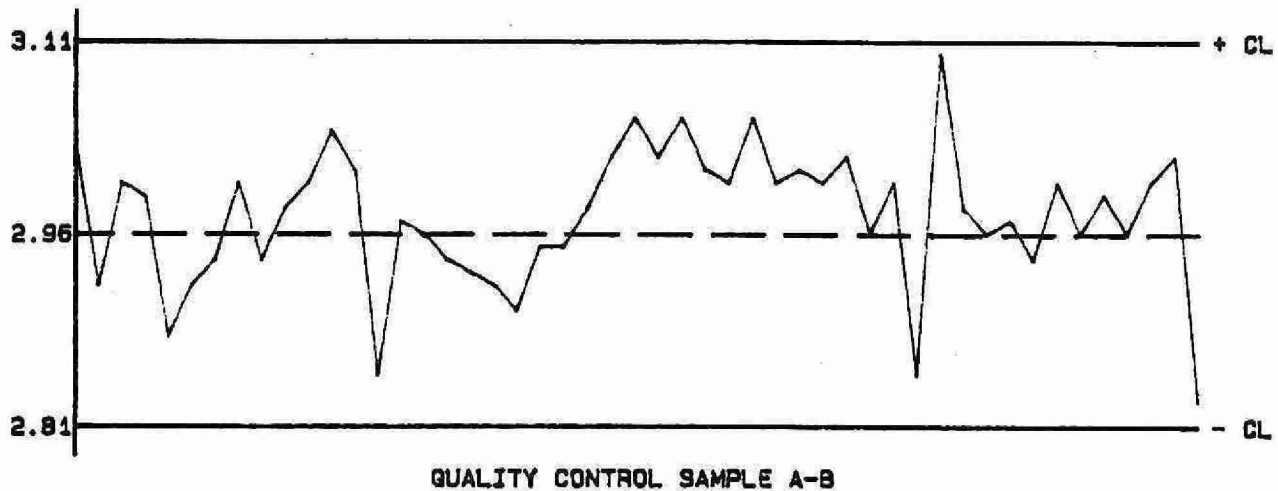
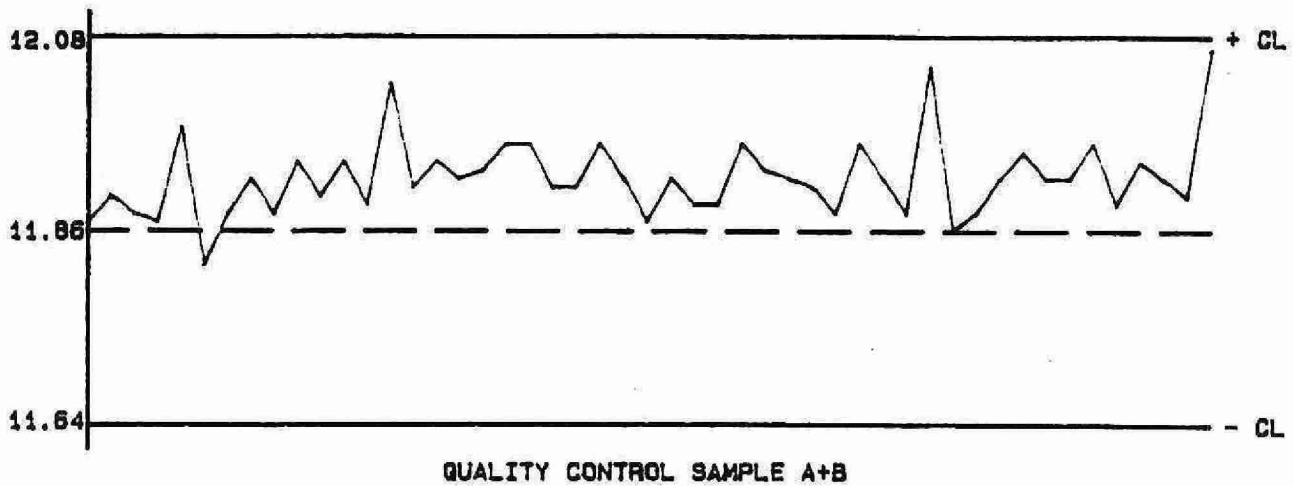
11.64 to 12.08 for A+B
 2.81 to 3.11 for A-B

DUPLICATES:

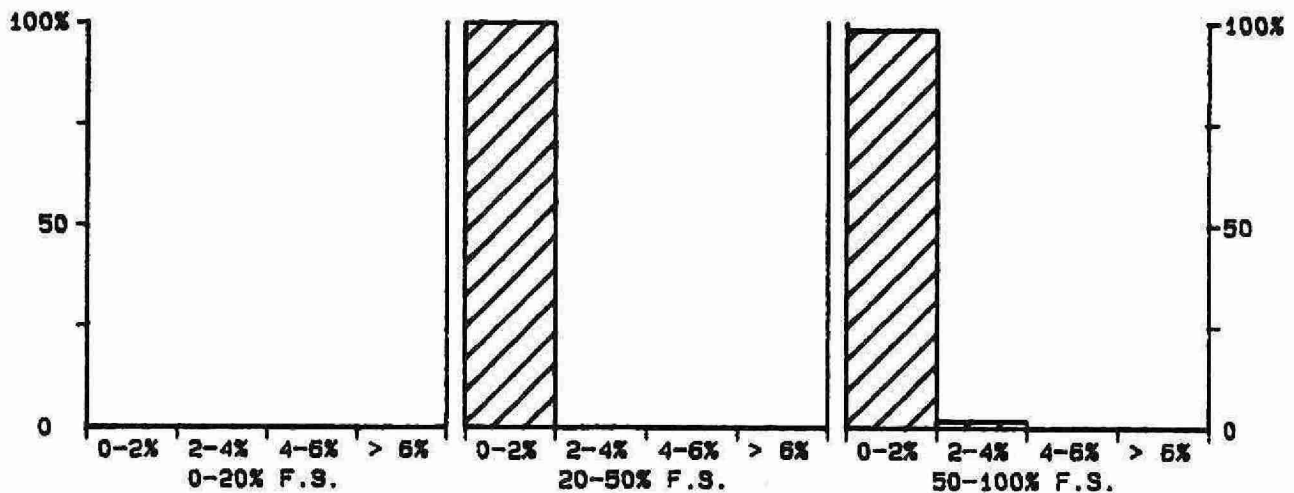
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
0	0.00 - 5.00	N/A	N/A
0	5.00 - 6.00	N/A	N/A
15	6.00 - 7.00	0.085	1.2
112	7.00 - 9.00	0.066	0.8
2	9.00 - 14.00	0.052	0.5
129	Overall	0.068	N/A

QUALITY CONTROL GRAPHS PH-RIVER TITRATION-RATS (DIMENSIONLESS)

FROM: 02/08/88
TO: 18/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14 DIMENSIONLESS

*** PH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: WATS	Unit Code	: nil
Method Code	: 003AI2	Supervisor	: F. Lo
Sample Type/Matrix	: Domestic Waters, Sewage, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

PH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards.

N.B. gran alkalinity, total fixed endpoint alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range 4 to 7

CONTROLS:

Calibration : 2 "standards", e.g. QCA
Drift : In run standards throughout the run (diluted tap water 50% V/V)

MODIFICATIONS:

14/03/86 -WATS workstation was introduced. This system was designed to determine pH, conductivity and total fixed endpoint alkalinity; it is microcomputer controlled and has direct computer (DCI) capabilities.

28/07/88 -Introduced new standardization procedure with buffers 9.18 and 4.008, and Q.C. standards at pH 7.41 and 4.45.

PH-WATER TITRATION-WATS
QUALITY CONTROL DATA FROM 04/01/88 TO 26/07/88

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	80	9.18	9.20	0.02	0.024
b :	79	4.45	4.49	0.04	0.066
a+b :	79	13.63	13.69	0.06	0.074
a-b :	79	4.73	4.72	-0.01	0.066

s.d.(AB): Sw(within run): 0.047 S(between runs): 0.050 S/Sw: 1.06

On any given day the calibration is accepted if the values obtained lie within the ranges:

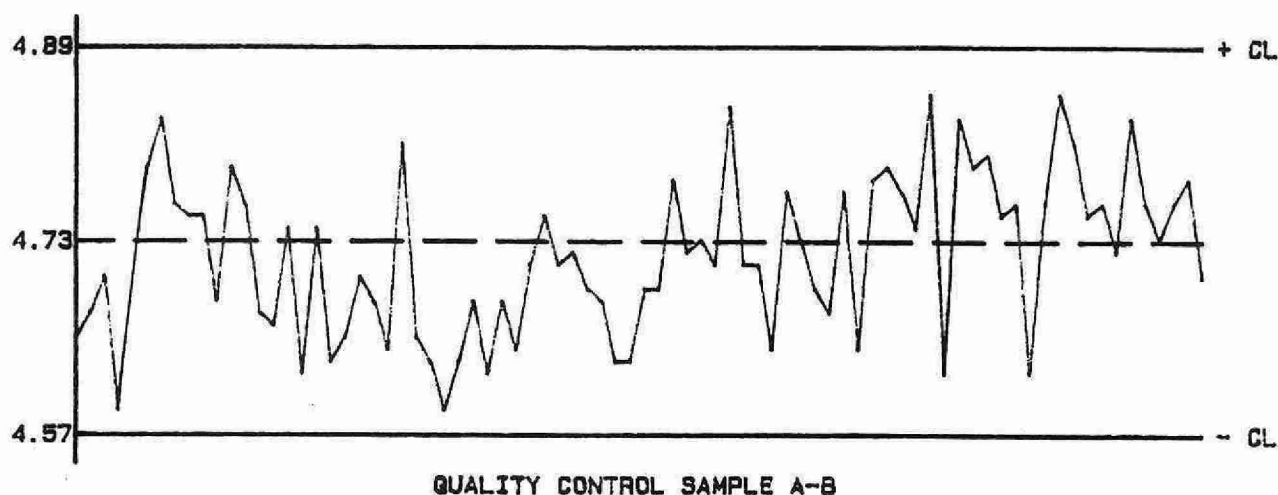
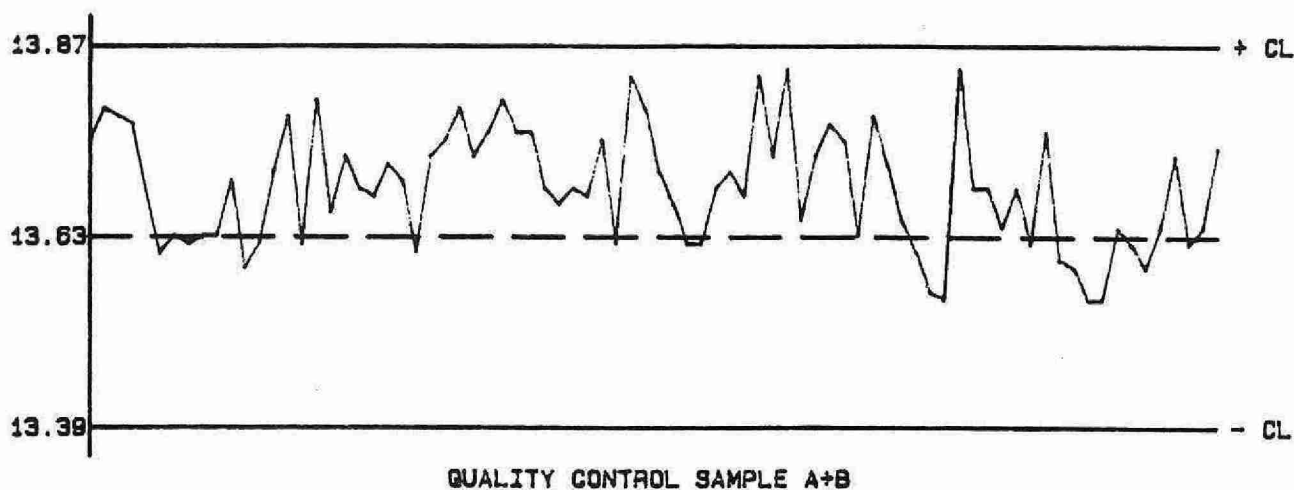
13.39 to 13.87 for A+B
 4.57 to 4.89 for A-B

DUPLICATES:

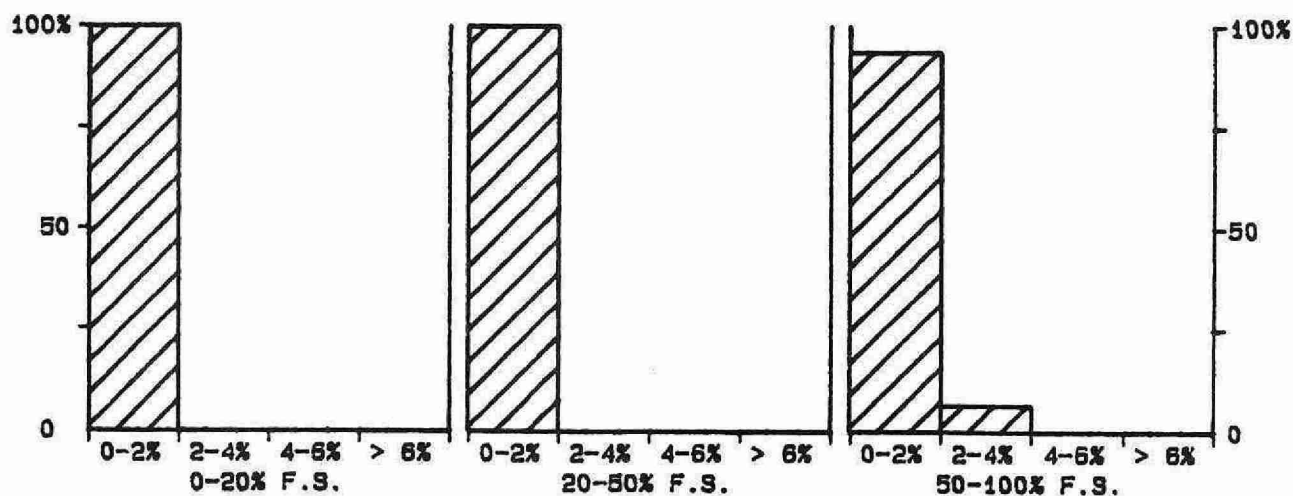
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.00 - 5.00	N/A	N/A
0	5.00 - 6.00	N/A	N/A
7	6.00 - 7.00	0.108	1.6
198	7.00 - 9.00	0.106	1.3
2	9.00 - 14.00	0.065	0.6
208	Overall	0.105	N/A

QUALITY CONTROL GRAPHS PH-WATER TITRATION-WATS (DIMENSIONLESS)

FROM: 04/01/88
TO: 26/07/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14 DIMENSIONLESS

PH - WATER TITRATION
QUALITY CONTROL DATA FROM 02/08/88 TO 28/12/88

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	46	7.41	7.45	0.04	0.022
b :	46	4.45	4.51	0.06	0.049
a+b :	46	11.86	11.96	0.10	0.053
a-b :	46	2.96	2.93	-0.03	0.055

s.d.(AB): Sw(within run): 0.039 S(between runs): 0.038 S/Sw: 0.98

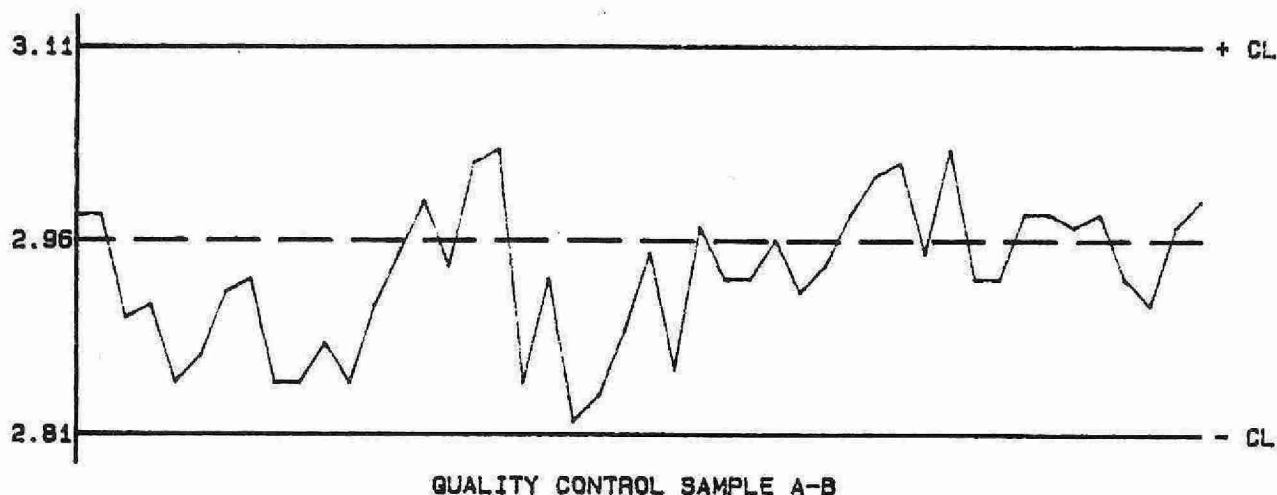
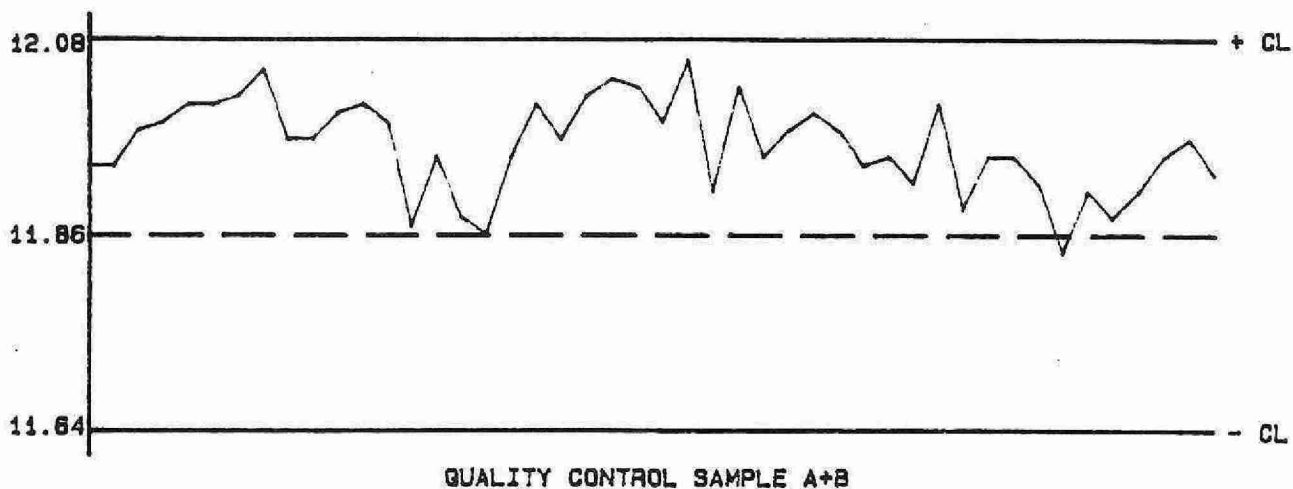
On any given day the calibration is accepted if the values obtained lie within the ranges:

11.64 to 12.08 for A+B
 2.81 to 3.11 for A-B

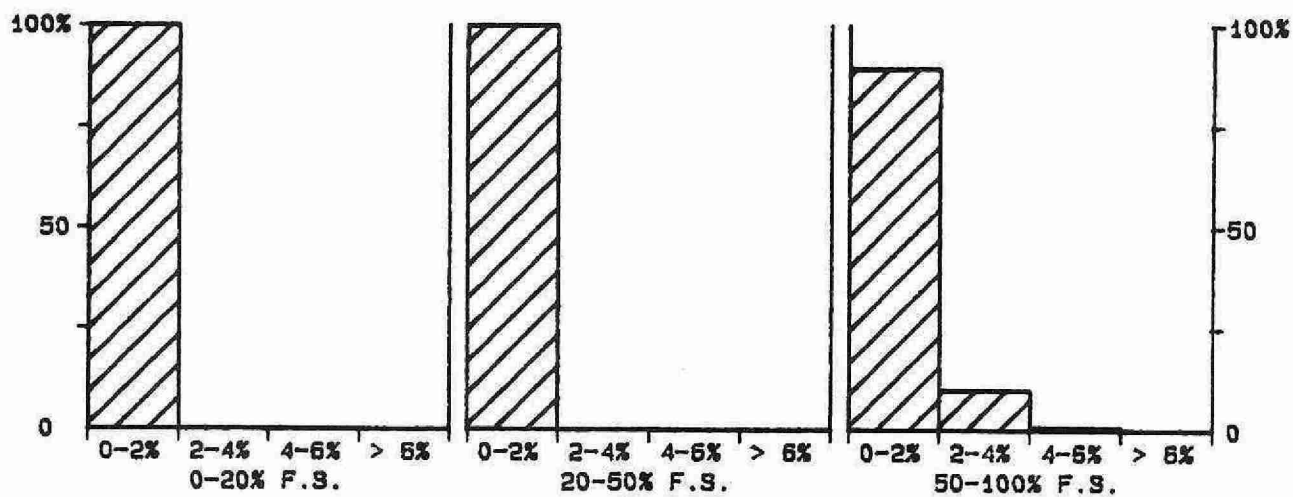
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	1	0.00 - 5.00	N/A	N/A
	1	5.00 - 6.00	N/A	N/A
	3	6.00 - 7.00	0.115	1.7
	129	7.00 - 9.00	0.116	1.4
	1	9.00 - 14.00	N/A	N/A
	135	Overall	0.121	N/A

QUALITY CONTROL GRAPHS PH-WATER TITRATION-WATS (DIMENSIONLESS)

FROM: 02/08/88
TO: 28/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14 DIMENSIONLESS

***** PH *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: Before '70
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: WQSDIRT	Unit Code	: Nil
Method Code	: 004AI4	Supervisor	: F. Lo
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required : 15 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (15 mL) at room temperature. Stirring rate and room temperature range are uniform for all samples and standards.

INSTRUMENTATION:

pH meter, stirrer, Radiometer combination electrode

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration : 2 standard buffers

MODIFICATIONS:

20/05/87 -Workstation introduced to Titration lab. Samples not stirred during pH measurement.
01/03/88 -PHM84 Radiometer pH meter and Radiometer combination pH electrode were used.
30/03/88 -Stirring sample during pH measurement was adopted.
25/07/88 -Introduced new standardization procedure with buffers at pH 9.18 and pH 4.008, and Q.C. solutions at pH 7.41 and 4.45.

PH-WQSDIRT
QUALITY CONTROL DATA FROM 05/01/88 TO 16/06/88

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	31	8.00	7.96	-0.04	0.026
b :	31	6.00	5.99	-0.01	0.021
a+b :	31	14.00	13.94	-0.06	0.036
a-b :	31	2.00	1.97	-0.03	0.031

s.d.(AB): Sw(within run): 0.022 S(between runs): 0.024 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

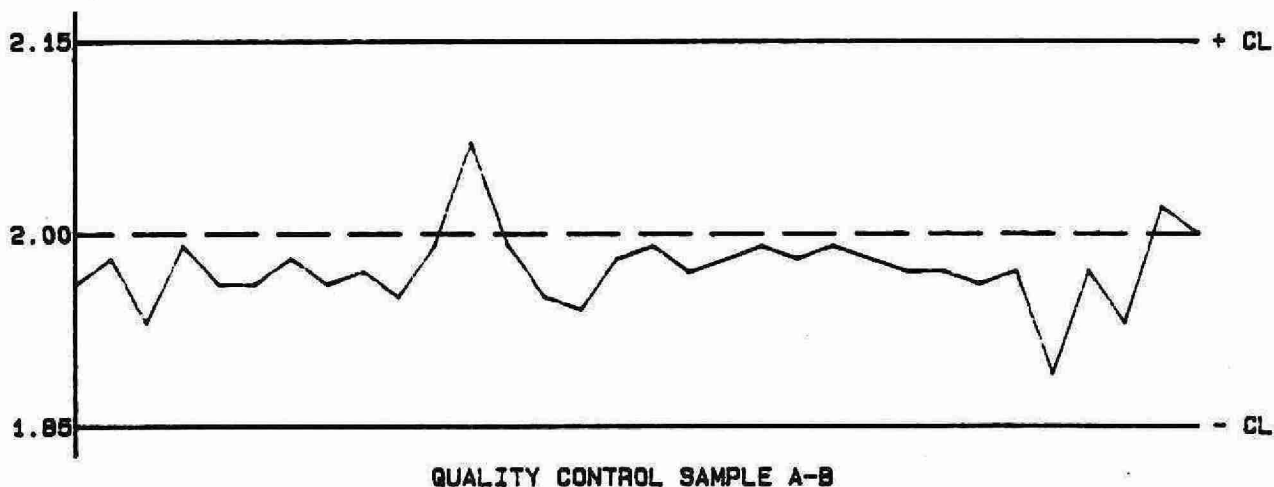
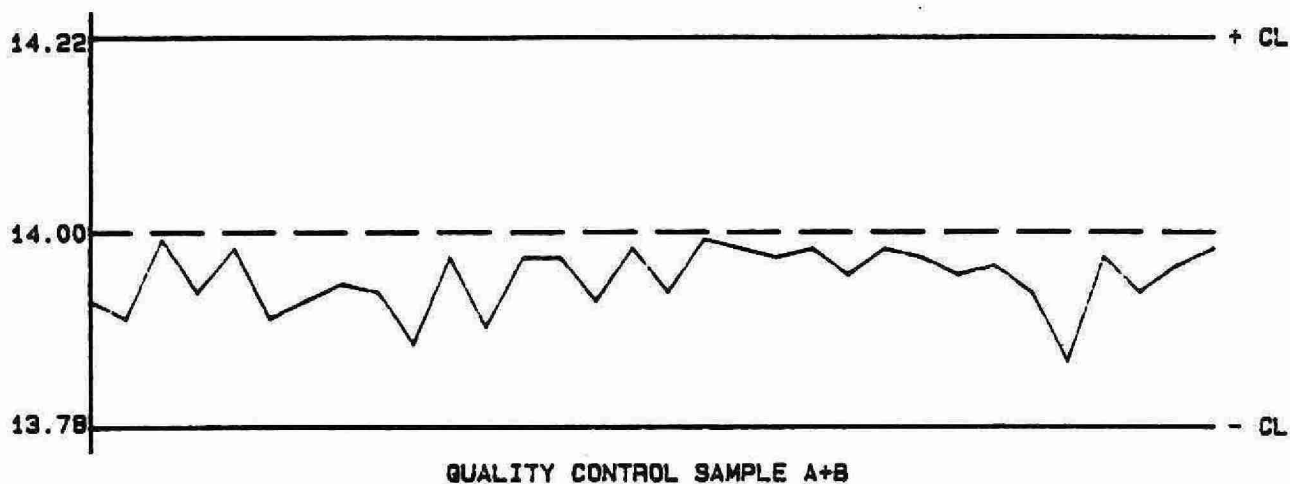
13.78 to 14.22 for A+B
1.85 to 2.15 for A-B

DUPLICATES:

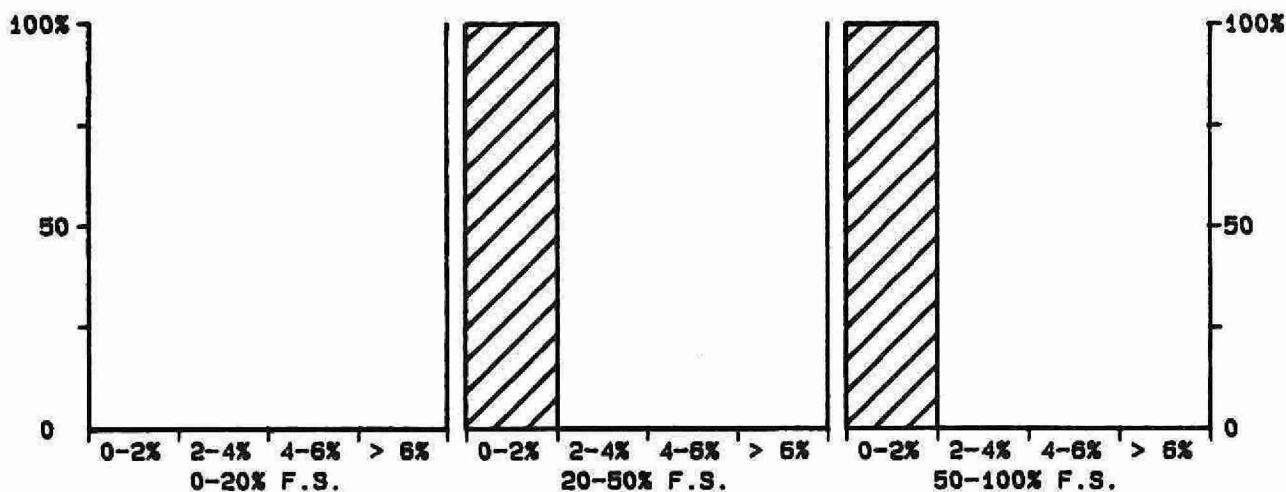
Number of Data Pairs	Sample Concn Span	Mean (2) s.d.	Coefficient of var. (%)
2	0.00 - 5.00	0.018	0.4
1	5.00 - 6.00	N/A	N/A
5	6.00 - 7.00	0.071	1.1
25	7.00 - 8.00	0.049	0.6
13	8.00 - 14.00	0.047	0.5
46	Overall	0.050	N/A

QUALITY CONTROL GRAPHS PH WQSDIRT (DIMENSIONLESS)

FROM: 05/01/88
TO: 18/06/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14 DIMENSIONLESS

PH-WQSDIRT
QUALITY CONTROL DATA FROM 03/08/88 TO 01/12/88

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	31	7.41	7.43	0.02	0.027
b :	31	4.45	4.45	-0.00	0.039
a-b :	31	11.86	11.87	0.01	0.042
a-b :	31	2.96	2.98	0.02	0.051

s.d.(AB): Sw(within run): 0.036 S(between runs): 0.034 S/Sw: 0.93

On any given day the calibration is accepted if the values obtained lie within the ranges:

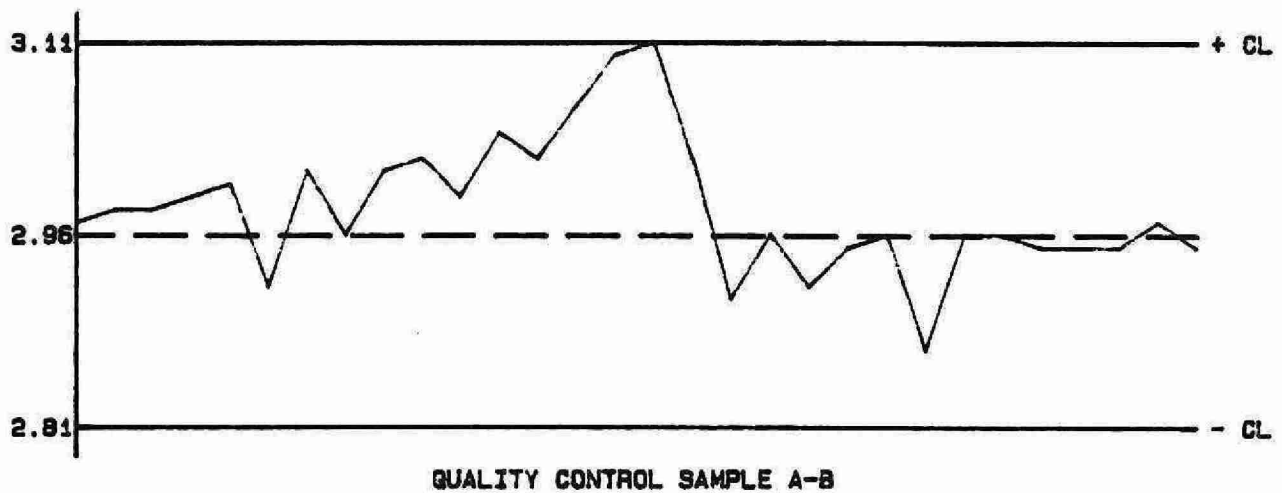
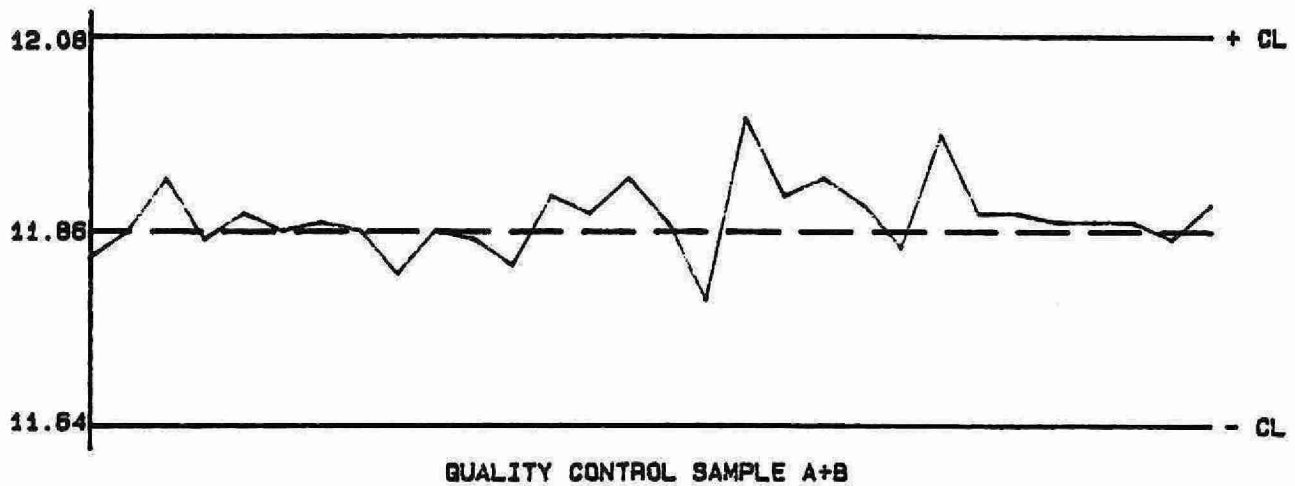
11.64 to 12.08 for A+B
 2.81 to 3.11 for A-B

DUPLICATES:

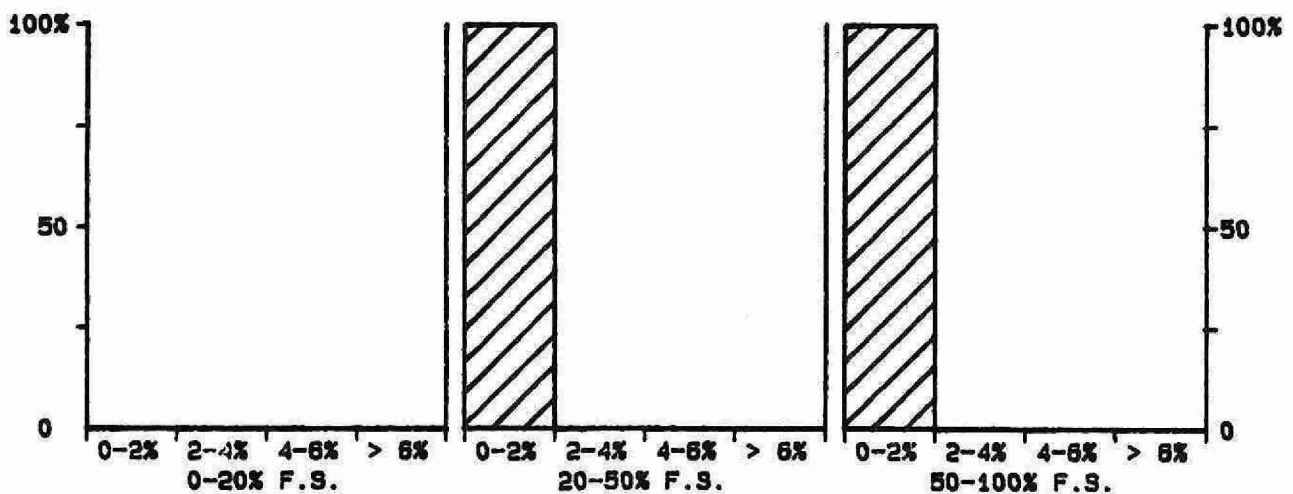
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
0	0.00 - 5.00	N/A	N/A
3	5.00 - 6.00	0.101	1.8
11	6.00 - 7.00	0.025	0.3
34	7.00 - 8.00	0.045	0.5
17	8.00 - 14.00	0.019	0.2
65	Overall	0.042	N/A

QUALITY CONTROL GRAPHS PH WQSDIRT (DIMENSIONLESS)

FROM: 03/08/88
TO: 01/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



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CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14 DIMENSIONLESS

***** PH SOIL (Xca) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: PHECA	Units	: dimensionless
Work Station Code	: DOSOILPH	Unit Code	: nil
Method Code	: 324AB1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

Ten grams of sample (<2 mm) plus 20 mL 0.01 M calcium chloride are agitated in a tube for 20 minutes. The mixture is removed and allowed to equilibrate for 30 minutes. PH is measured on the supernatant.

INSTRUMENTATION:

-Corning pH/ion meter 150
-Corning Combination X-EL electrode balance accurate to 0.001 g.

REPORTING:

Maximum Significant Figures: 2 Calculated W value: N/A T value: N/A

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : 3 buffers
Recovery : 2 long term soil samples plus round robin CSSC samples
(latter run occasionally).

MODIFICATIONS:

01/10/80 -Radiometer PHM62 replaced Fisher pH meter.
01/05/84 -Corning pH/ion meter 150 replaced Radiometer PHM62.
01/02/84 -Samples are agitated in a tube for 20 minutes as opposed to being stirred intermittently in a beaker for 30 minutes.

PH - SOIL (XCa)
QUALITY CONTROL DATA FROM 11/04/88 TO 20/06/88

Lab: Dorset Soils

Analytical Range: - to 10.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	25	7.00	7.05	0.05	0.013
b :	25	4.00	4.00	-0.00	0.005
a+b :	25	11.00	11.05	0.05	0.014
a-b :	25	3.00	3.05	0.05	0.012
c :	25	4.00	4.00	-0.00	0.005
d :	25	6.80	6.81	0.01	0.015
c+d :	25	10.80	10.81	0.01	0.018
c-d :	25	-2.80	-2.81	-0.01	0.014

s.d.(AB): Sw(within run): 0.008 S(between runs): 0.010 S/Sw: 1.16
s.d.(CD): Sw(within run): 0.010 S(between runs): 0.011 S/Sw: 1.13

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.70 to 11.30 for A+B
2.80 to 3.20 for A-B
10.50 to 11.10 for C+D
-3.00 to -2.60 for C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	25	4.48	4.49	0.029
r2 :	25	4.53	4.53	0.078

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
38	0.00 - 5.00	0.016	0.3
11	5.00 - 10.00	0.018	0.3
49	Overall	0.017	N/A

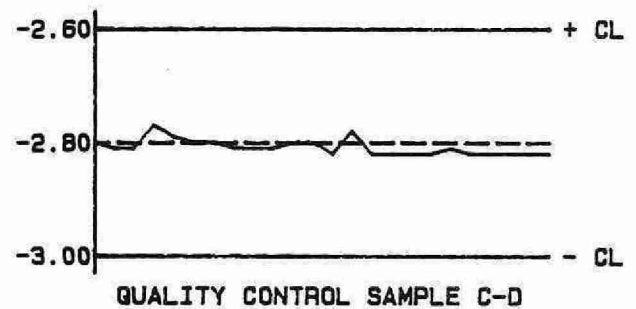
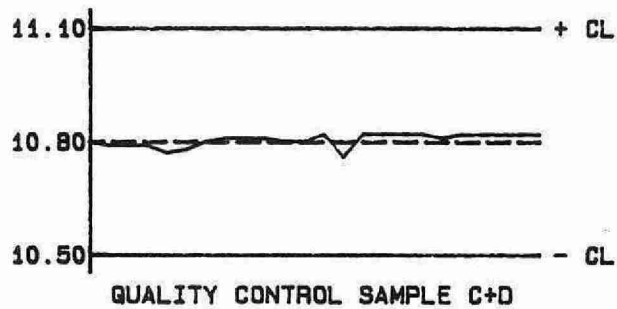
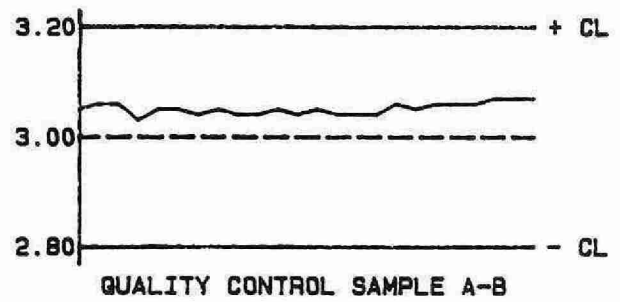
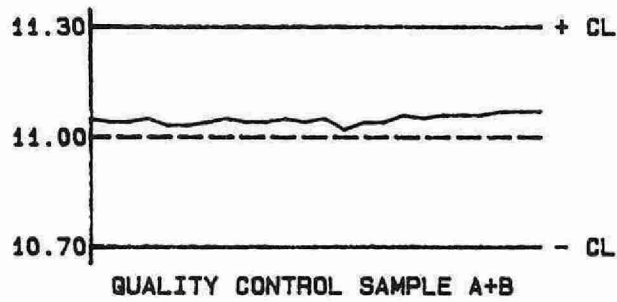
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
slope :	25	57	0.4

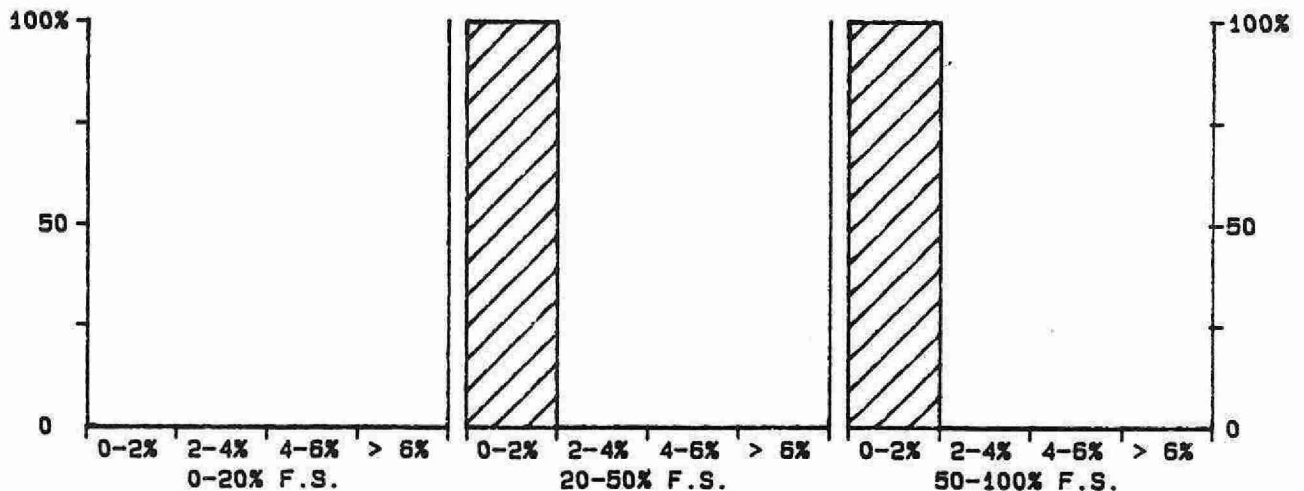
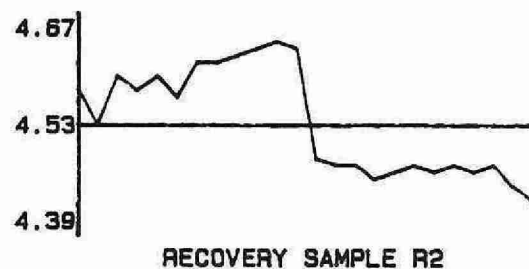
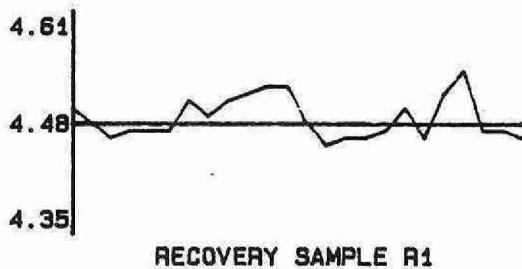
QUALITY CONTROL GRAPHS PH - SOIL (XCA) (DIMENSIONLESS)

FROM: 11/04/88

TO: 20/06/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-260-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10 DIMENSIONLESS

PH - SOIL (XCa)
QUALITY CONTROL DATA FROM 21/06/88 TO 27/06/88

Lab: Dorset Soils

Analytical Range: - to 10.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	4	7.00	7.08	0.07	0.010
b :	4	4.00	4.00	0.00	0.010
a+b :	4	11.00	11.08	0.08	0.000
a-b :	4	3.00	3.07	0.07	0.020
c :	4	4.00	4.00	0.00	0.010
d :	4	6.80	6.82	0.02	0.010
c+d :	4	10.80	10.83	0.03	0.005
c-d :	4	-2.80	-2.82	-0.02	0.019

s.d.(AB): Sw(within run): 0.014 S(between runs): 0.010 S/Sw: 0.71
s.d.(CD): Sw(within run): 0.013 S(between runs): 0.010 S/Sw: 0.74

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.70 to 11.30 for A+B
2.80 to 3.20 for A-B
10.50 to 11.10 for C+D
-3.00 to -2.60 for C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	4	4.78	4.77	0.025
r2 :	4	7.80	7.78	0.056

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
8	0.00 - 5.00	0.007	0.1
0	5.00 - 10.00	N/A	N/A
8	Overall	0.007	N/A

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
slope :	4	57	0.0

NOTE: Due to insufficient data, graphs have been excluded.

***** PH SOIL (Xw) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: PHEW	Units	: dimensionless
Work Station Code	: DOSOILPH	Unit Code	: nil
Method Code	: 304AB1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass or plastic jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

Ten grams of sample (<2 mm) plus 20 mL of deionized water are agitated in a tube for 20 minutes. The mixture is removed and allowed to equilibrate for 30 minutes. PH is measured on the supernatant.

INSTRUMENTATION:

-Corning pH/ion meter 150
-Corning Combination X-EL electrode balance accurate to 0.001 g.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: N/A T value: N/A.

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : 3 buffers
Recovery : 2 long term soil samples plus round robin CSSC samples (run occasionally).

MODIFICATIONS:

01/10/80 -Radiometer PHM62 replaced Fisher pH meter.
01/05/84 -Corning pH/ion meter 150 replaced Radiometer PHM62.
01/02/84 -Samples are agitated in a tube for 20 minutes as opposed to being stirred intermittently in a beaker for 30 minutes.

PH - SOIL (X_w)
 QUALITY CONTROL DATA FROM 11/04/88 TO 20/06/88

Lab: Dorset Soils

Analytical Range: - to 9.00 Dimensionless

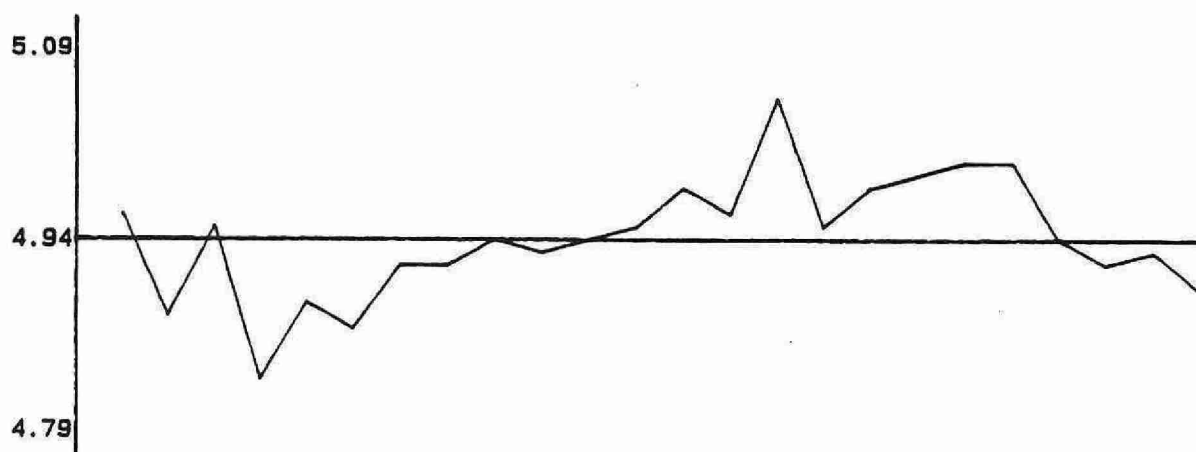
RECOVERIES:	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	24	4.94	4.94	0.046
r2 :	25	5.33	5.33	0.042

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	26	3.00 - 5.00	0.014	0.3
	20	5.00 - 7.00	0.022	0.3
	3	7.00 - 9.00	0.013	0.1
	49	Overall	0.017	N/A

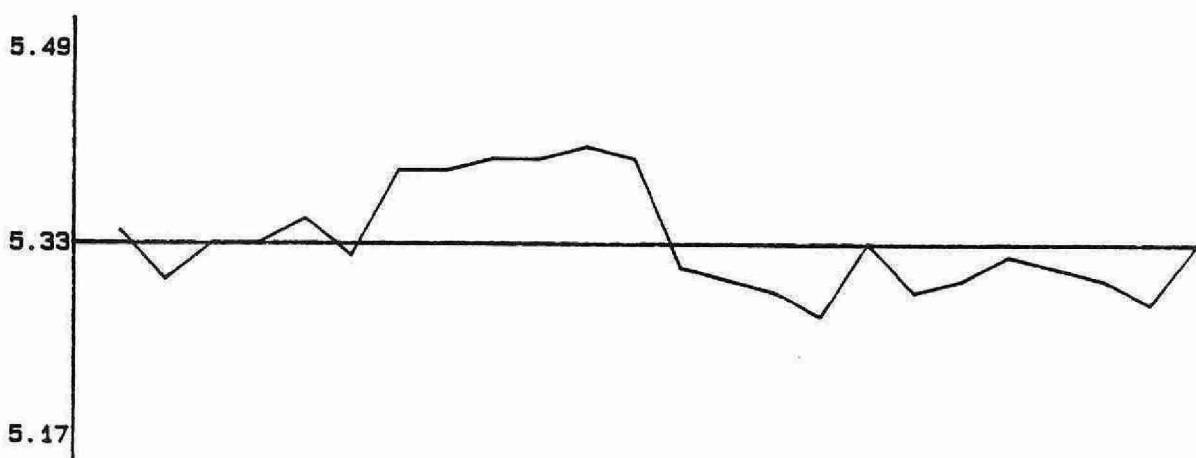
QUALITY CONTROL GRAPHS

PH - SOIL (XW) (DIMENSIONLESS)

FROM: 11/04/88
TO: 20/06/88

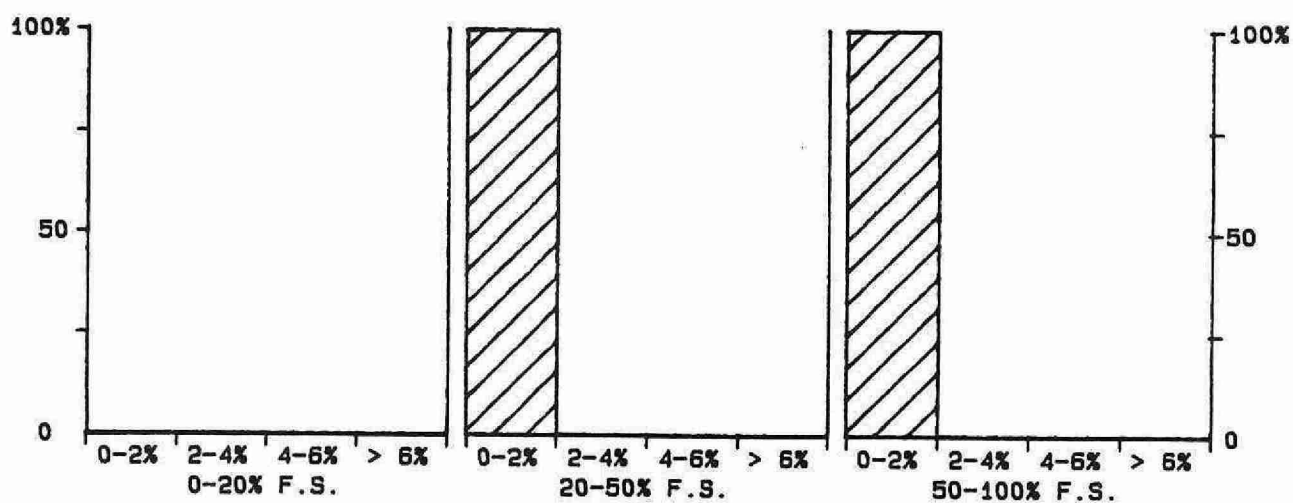


RECOVERY SAMPLE R1



RECOVERY SAMPLE R2

--- EXPECTED VALUE



-264-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14 DIMENSIONLESS

PH - SOIL (Xw)
 QUALITY CONTROL DATA FROM 21/06/88 TO 27/06/88

Lab: Dorset Soils

Analytical Range: - to 9.00 Dimensionless

RECOVERIES:	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
	-----	-----	-----	-----
r1 :	4	5.80	5.83	0.051
r2 :	4	8.70	8.74	0.067

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	-----	-----	-----	-----
	7	3.00 - 5.00	0.020	0.4
	1	5.00 - 7.00	N/A	N/A
	0	7.00 - 9.00	N/A	N/A
	8	Overall	0.019	N/A

NOTE: Due to insufficient data, graphs have been excluded.

***** PHENOLICS - REACTIVE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/74
LIS Test Name Code	: PHNOL	Units	: ug/L as Phenol
Work Station Code	: ROPHEN	Unit Code	: 063704
Method Code	: 002BC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewage, Industrial Wastes		

SAMPLING:

Quantity Required	: 250 mL
Container	: Glass
Preservative	: Copper sulphate-phosphoric acid (see note 2, below)
Other	: Special bottle (with white cap) containing preservative is available

ANALYTICAL PROCEDURE:

Samples are automatically distilled from an acid media, and reactive phenolics in the distillate are determined colourimetrically by formation of an antipyrene dye through reactions with 4-aminoantipyrene and potassium ferricyanide.
Approximate absorbance: 0.03 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus a distillation module. Colourimetric measurement is through a 5.0 cm. light path at 505 nm.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

BL plus 2 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, standard, BL every 10 samples

NOTES:

1. A report identifying reactive phenolics is available on request.
2. As of June 4, 1989, the copper sulphate-phosphoric acid preservative will be discontinued in favour of preservation by sulfuric acid to pH 1.5 - 2. Samples arriving after that date with copper sulphate-phosphoric acid preservative will be discarded.

PHENOLICS-REACTIVE-ROPHEN
QUALITY CONTROL DATA FROM 04/01/88 TO 29/12/88

Lab: Colourimetry

Analytical Range: - to 50.0 ug/L as PHENOL

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	114	40.0	39.8	-0.2	0.67
b :	114	10.0	10.4	0.4	0.35
a+b :	114	50.0	50.2	0.2	0.91
a-b :	114	30.0	29.4	-0.6	0.56

s.d.(AB): Sw(within run): 0.40 S(between runs): 0.53 S/Sw: 1.35

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.8 to 52.2 for A+B
 28.5 to 31.5 for A-B

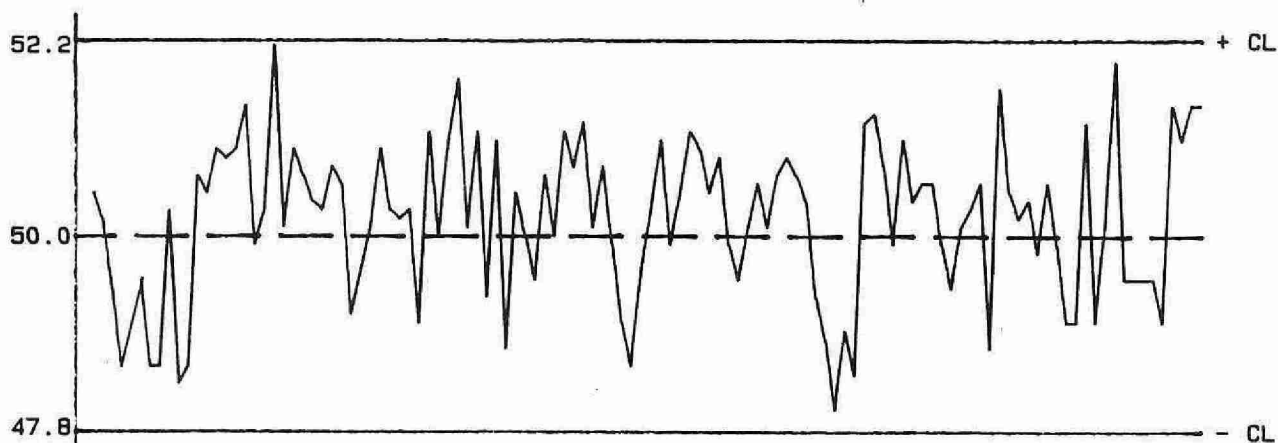
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	181	0.0 - 5.0	0.34	20.4
	17	5.0 - 10.0	0.53	7.8
	19	10.0 - 25.0	1.12	7.4
	4	25.0 - 50.0	1.10	3.2
	221	Overall	0.50	N/A

OTHER CHECKS:

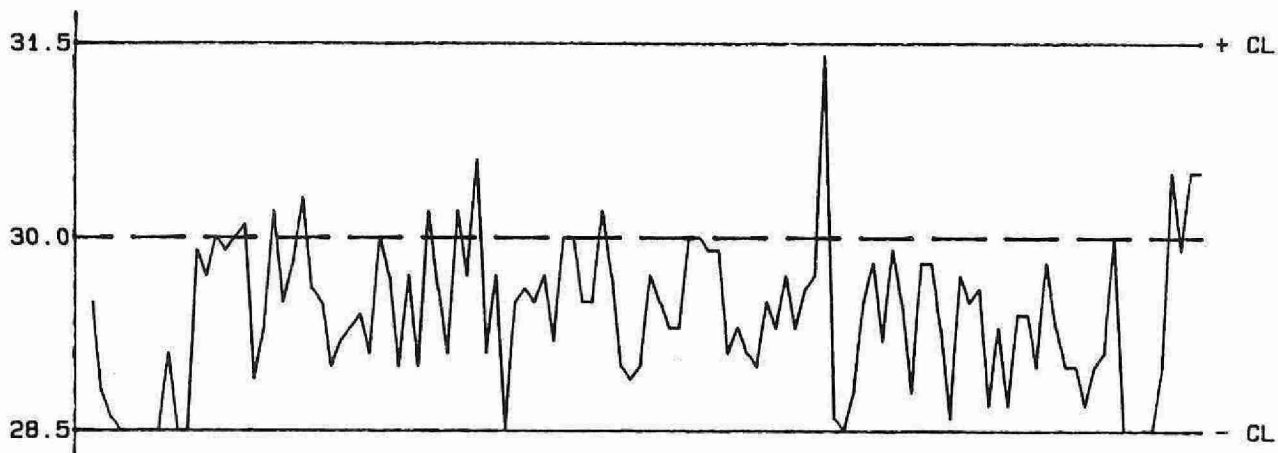
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	0	N/A	N/A

QUALITY CONTROL GRAPHS PHENOLICS-REACTIVE-ROPHEN (UG/L AS PHENOL)

FROM: 04/01/88
 TO: 29/12/88

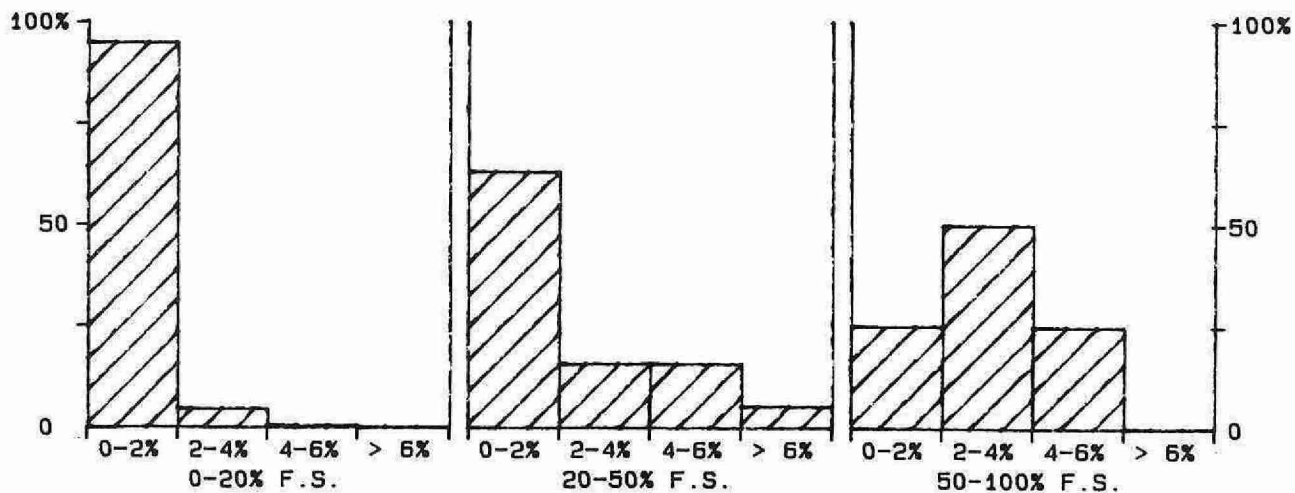


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
 --- CONTROL LIMIT (CL)



-268-
 CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
 FULL SCALE VALUE (F.S.): 50 UG/L AS PHENOL

***** PHOSPHORUS -REACTIVE ORTHOPHOSPHATE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPO4FR	Units	: mg/L as P
Work Station Code	: RNDNP	Unit Code	: 064815
Method Code	: 103DC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Orthophosphate is determined on the supernatant of a settled sample by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent. Approximate absorbance: 0.2 at the full scale level.
N.B. Ammonia plus ammonium, nitrite, and nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube.
Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.0005	T value: 0.0025
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

MODIFICATIONS:

01/02/85 -Sample filtration was eliminated for all sample classes but Great Lakes (G). Reduction period was reduced from 4 to 2 min. to lessen danger of polyphosphate conversion to orthophosphate during analysis.
15/05/84 -Commodore PET microcomputer system was introduced. At this time the number of calibration standards was increased from 3 to 7, and the calibration technique was changed from linear interpolation to the use of a quadratic.
01/10/84 -Sample filtration was eliminated from Great Lakes (G) samples.
12/02/86 -HP9920 microcomputer introduced to replace Commodore PET.

PHOSPHORUS-REACTIVE ORTHOPHOSPHATE-RNDNP
QUALITY CONTROL DATA FROM 02/02/88 TO 22/12/88

Lab: Colourimetry

Analytical Range: - to 0.1250 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	117	0.0800	0.0802	0.0002	0.00030
b :	117	0.040	0.040	0.000	0.0008
a+b :	117	0.120	0.120	0.000	0.0012
a-b :	117	0.040	0.040	0.000	0.0012
c :	117	0.040	0.040	0.000	0.0008
d :	117	0.0080	0.0077	-0.0003	0.00072
c+d :	117	0.0480	0.0477	-0.0003	0.00124
c-d :	117	0.0320	0.0323	0.0003	0.00073

s.d.(AB): Sw(within run): 0.00085 S(between runs): 0.00085 S/Sw: 1.00
s.d.(CD): Sw(within run): 0.0005 S(between runs): 0.0008 S/Sw: 1.47

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.115 to 0.124 for A+B
0.037 to 0.043 for A-B
0.0450 to 0.0510 for C+D
0.0300 to 0.0340 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	234	0.0000 - 0.0100	0.0007	23.5
	30	0.0100 - 0.0200	0.0014	10.5
	30	0.0200 - 0.0500	0.0011	3.6
	10	0.0500 - 0.1250	0.0017	2.3
	304	Overall	0.0009	N/A

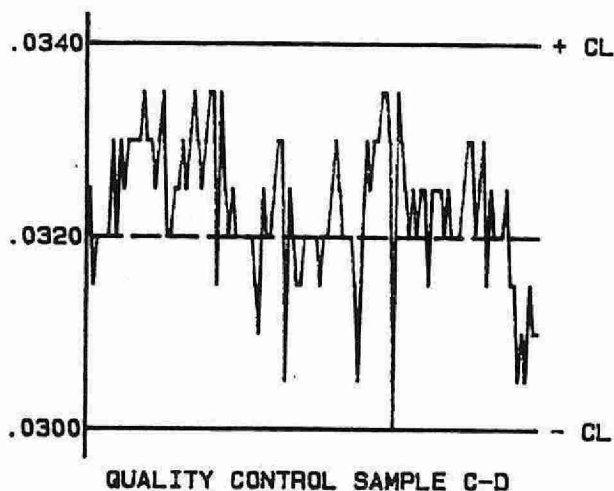
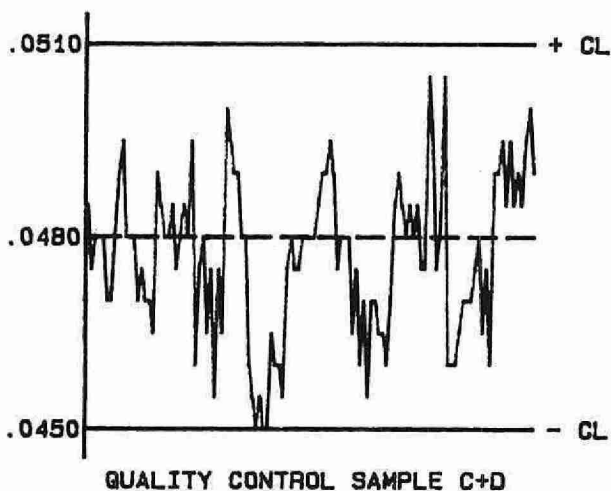
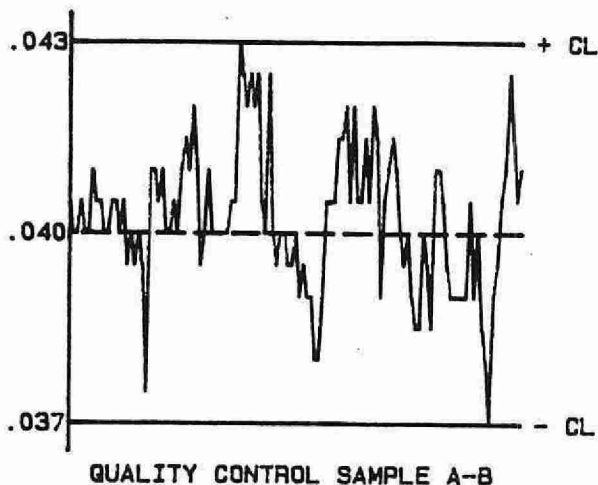
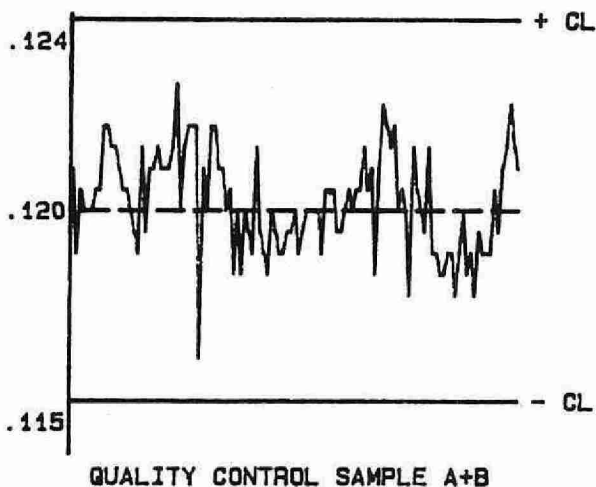
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	116	0.0008	0.00059

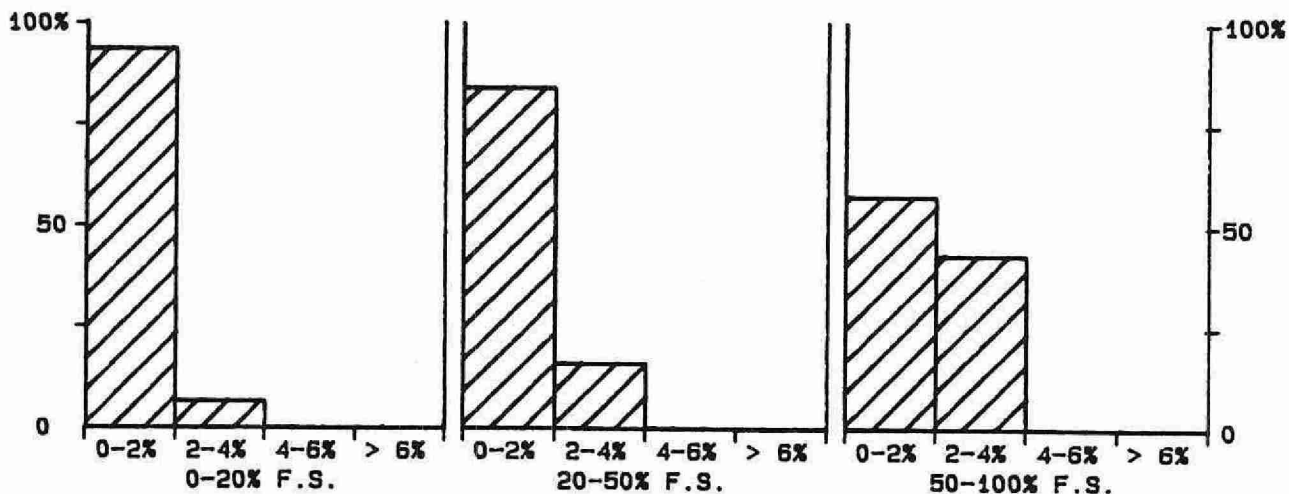
QUALITY CONTROL GRAPHS

FROM: 02/02/88
TO: 22/12/88

PHOSPHORUS-REACTIVE ORTHOPHOSPHATE-RNDNP (MG/L AS P)



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



***** PHOSPHORUS - REACTIVE ORTHOPHOSPHATE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPO4FR	Units	: mg/L as P
Work Station Code	: SDNP	Unit Code	: 064815
Method Code	: 103BC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required : 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Orthophosphate is determined on the supernatant of a settled sample by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent. Approximate absorbance: 0.5 at the full scale level.
N.B. Ammonia plus ammonium, nitrite, and nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using IR sensitive phototube. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; standard every 20 samples

MODIFICATIONS:

02/07/85 -Sample filtration was eliminated for all sample classes.
18/06/86 -HP9920 microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to the use of a quadratic using 6 standards instead of 2.

PHOSPHORUS-REACTIVE ORTHOPHOSPHATE-SDNP
QUALITY CONTROL DATA FROM 02/02/88 TO 29/12/88

Lab: Colourimetry

Analytical Range: - to 10.00 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	147	8.00	8.02	0.02	0.074
b :	147	4.00	4.00	-0.00	0.036
a+b :	147	12.00	12.01	0.01	0.094
a-b :	147	4.00	4.02	0.02	0.069
c :	147	4.00	4.00	-0.00	0.036
d :	147	0.80	0.77	-0.03	0.019
c+d :	147	4.80	4.77	-0.03	0.044
c-d :	147	3.20	3.22	0.02	0.036

s.d.(AB): Sw(within run): 0.049 S(between runs): 0.058 S/Sw: 1.19
s.d.(CD): Sw(within run): 0.025 S(between runs): 0.029 S/Sw: 1.13

On any given day the calibration is accepted if the values obtained lie within the ranges:

11.55 to 12.45 for A+B
3.70 to 4.30 for A-B
4.62 to 4.98 for C+D
3.08 to 3.32 for C-D

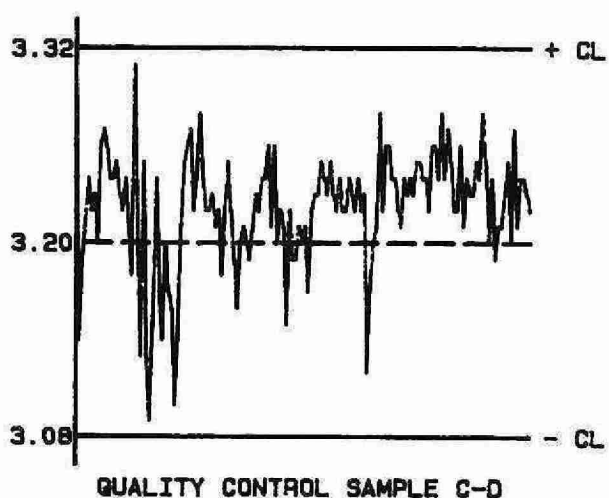
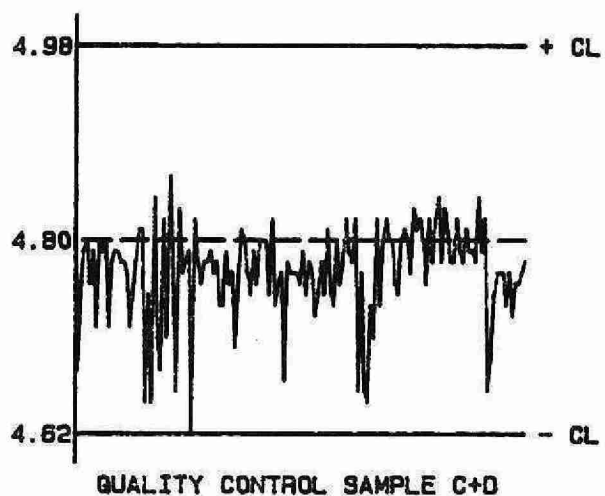
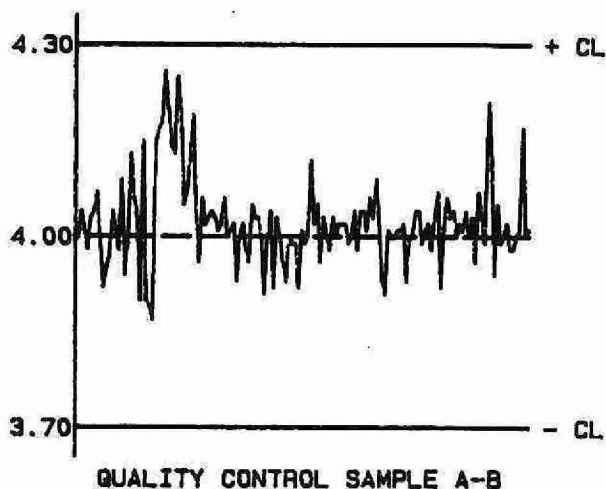
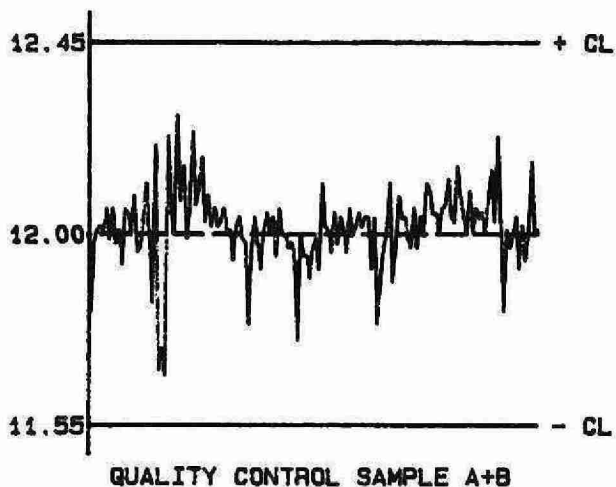
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	342	0.00 - 0.40	0.024	15.9
	39	0.40 - 1.00	0.061	10.8
	16	1.00 - 2.00	0.054	3.6
	23	2.00 - 4.00	0.087	3.0
	7	4.00 - 10.00	0.088	1.6
	427	Overall	0.038	N/A

OTHER CHECKS:

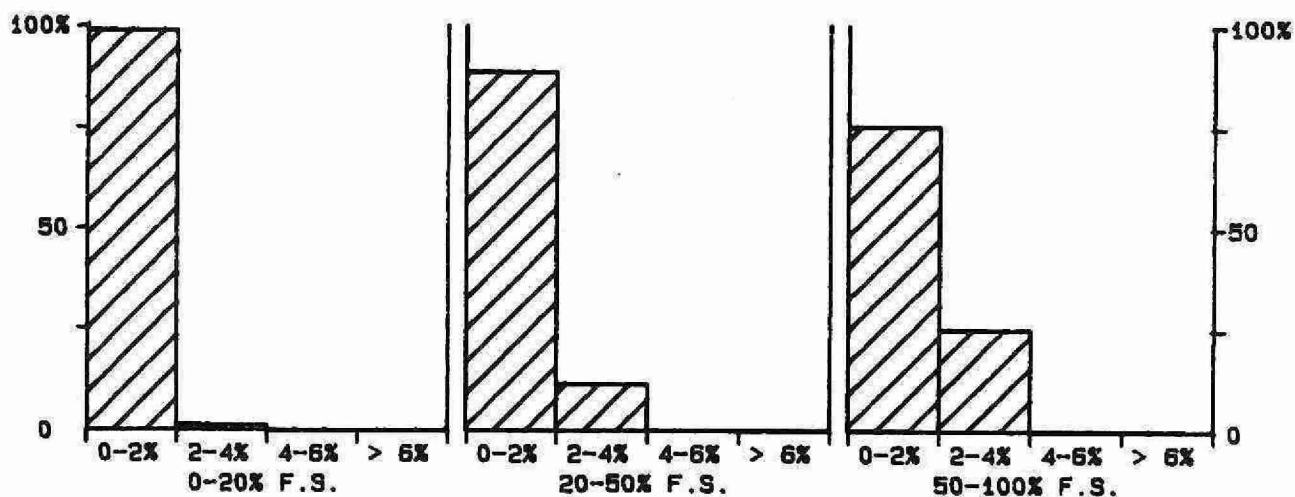
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	3	0.02	0.006

QUALITY CONTROL GRAPHS PHOSPHORUS-REACTIVE ORTHOPHOSPHATE-SDNP (MG/L AS P)

FROM: 02/02/88
TO: 29/12/88



— EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10 MG/L AS P

***** PHOSPHORUS - TOTAL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPUT	Units	: mg/L as P
Work Station Code	: RTNP	Unit Code	: 064815
Method Code	: 504AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using two block digesters kept at 200°C and 360°C. The pH of the digestate is adjusted in-line and then orthophosphate is determined by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.4 at the full scale level.

N.B. Total Kjeldahl nitrogen is determined simultaneously.

INSTRUMENTATION:

- Block digesters (2)
- Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube.
- Data capture, reduction, and processing via a multi-stage microcomputer system

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.002 T value: 0.01

CALIBRATION:

BL plus 4 standards

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Recovery : 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift : BL every 10 samples; undigested standard every 20 samples

MODIFICATIONS:

15/08/83 -Commodore PET microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to the use of a quadratic.
26/02/86 -HP9920 microcomputer replaced Commodore PET.

PHOSPHORUS-TOTAL-RTNP
QUALITY CONTROL DATA FROM 02/02/88 TO 30/12/88

Lab: Colourimetry

Analytical Range: - to 0.200 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	167	0.160	0.160	0.000	0.0013
b :	167	0.080	0.080	0.000	0.0008
a+b :	167	0.240	0.241	0.001	0.0018
a-b :	167	0.080	0.080	-0.000	0.0011

s.d.(AB): Sw(within run): 0.0008 S(between runs): 0.0011 S/Sw: 1.39

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.231 to 0.249 for A+B
0.074 to 0.086 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	155	0.140	0.135	0.0037
r2 :	162	0.084	0.081	0.0030
r3 :	159	0.028	0.027	0.0017

DUPLICATES:

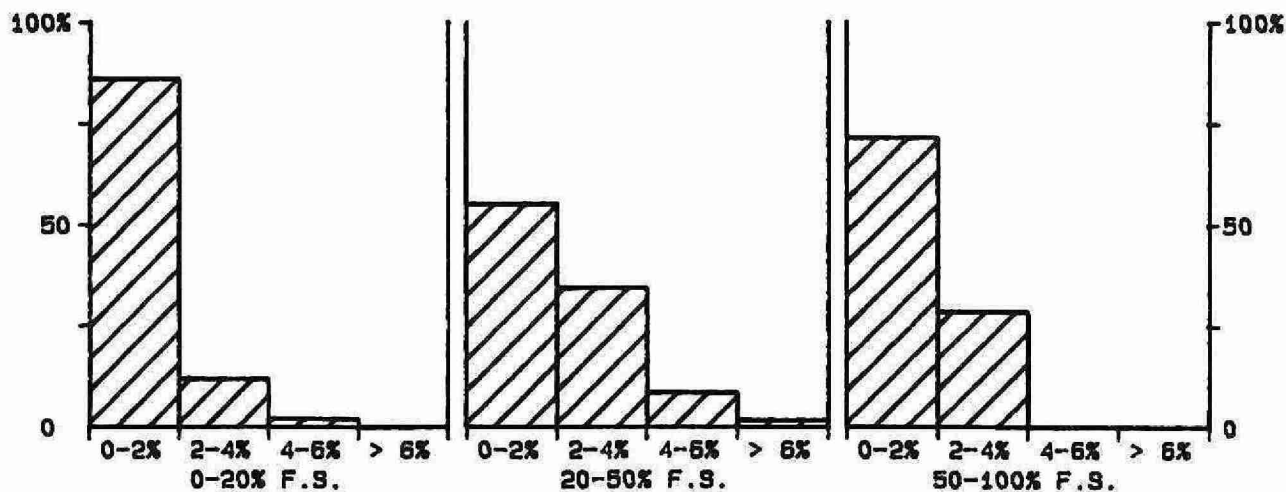
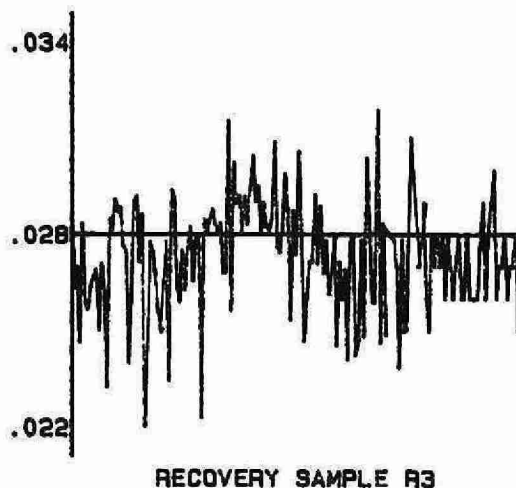
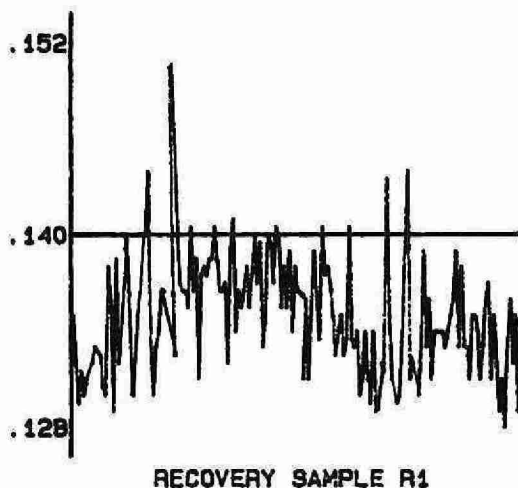
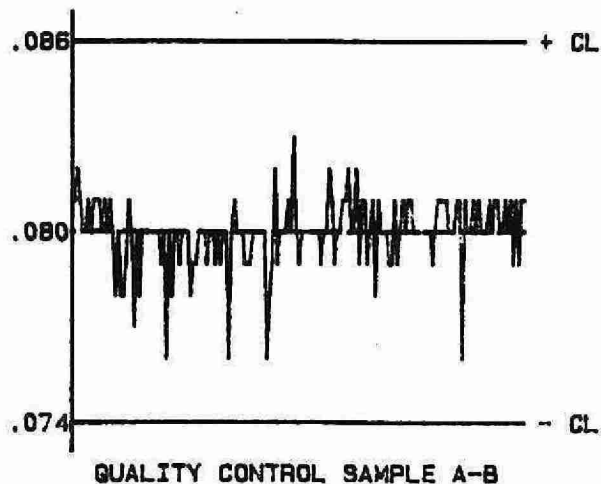
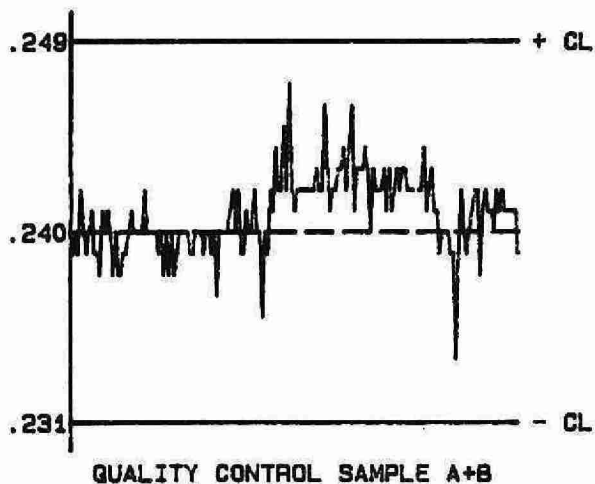
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
297	0.000 - 0.020	0.0016	18.5
104	0.020 - 0.050	0.0029	9.4
40	0.050 - 0.100	0.0039	5.8
13	0.100 - 0.200	0.0024	1.7
454	Overall	0.0023	N/A

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	166	0.000	0.0006
Digested Blank :	167	0.002	0.0023

QUALITY CONTROL GRAPHS PHOSPHORUS-TOTAL-RTNP (MG/L AS P)

FROM: 02/02/88
TO: 30/12/88



***** PHOSPHORUS - TOTAL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPUT	Units	: mg/L as P
Work Station Code	: STKNP	Unit Code	: 064815
Method Code	: 504BC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using two block digesters kept at 200°C and 360°C. The pH of the digestate is adjusted in-line and then orthophosphate is determined by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.8 at the full scale level.

N.B. Total Kjeldahl Nitrogen is determined simultaneously.

INSTRUMENTATION:

- Block digesters (2)
- Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using an IR sensitive phototube. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Recovery : 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift : BL every 10 samples; undigested standard every 20 samples

MODIFICATIONS:

01/10/85 -Higher range selected, full scale changed from 2 to 5 mg/L as P. New calibration controls added. Calibration control results collected before high range was implemented are included in plot.

18/06/86 -HP9920 microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to the use of a quadratic using 6 standards instead of 2.

PHOSPHORUS-TOTAL-STKNP
QUALITY CONTROL DATA FROM 02/02/88 TO 29/12/88

Lab: Colourimetry

Analytical Range: - to 5.00 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	159	4.00	4.02	0.02	0.027
b :	159	2.00	2.00	0.00	0.014
a+b :	159	6.00	6.02	0.02	0.036
a-b :	159	2.00	2.01	0.01	0.024
c :	159	2.000	2.004	0.004	0.0136
d :	159	0.400	0.395	-0.005	0.0036
c+d :	159	2.400	2.398	-0.002	0.0151
c-d :	159	1.600	1.609	0.009	0.0180

s.d.(AB): Sw(within run): 0.017 S(between runs): 0.022 S/Sw: 1.27
s.d.(CD): Sw(within run): 0.0127 S(between runs): 0.0118 S/Sw: 0.92

On any given day the calibration is accepted if the values obtained lie within the ranges:

5.77 to 6.23 for A+B
1.85 to 2.15 for A-B
2.310 to 2.490 for C+D
1.540 to 1.660 for C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	156	3.50	3.47	0.066
r2 :	156	2.10	2.08	0.041
r3 :	156	0.700	0.678	0.0204

DUPLICATES:

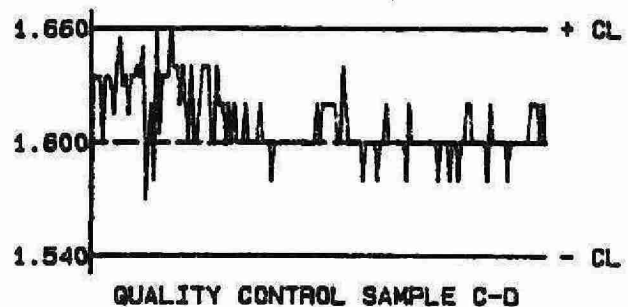
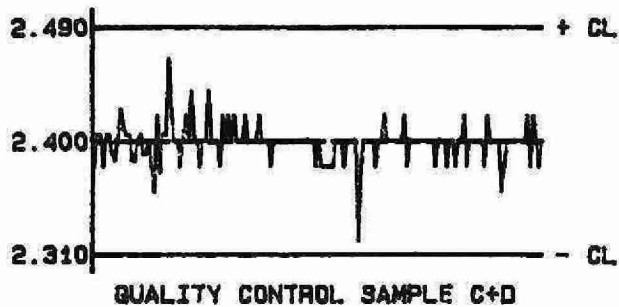
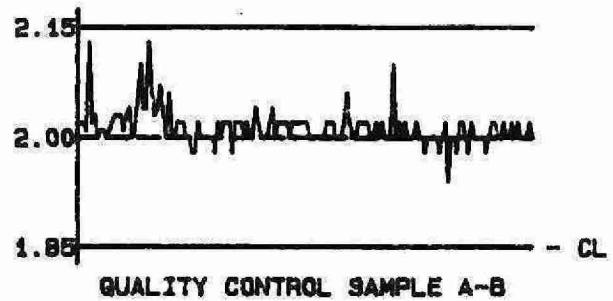
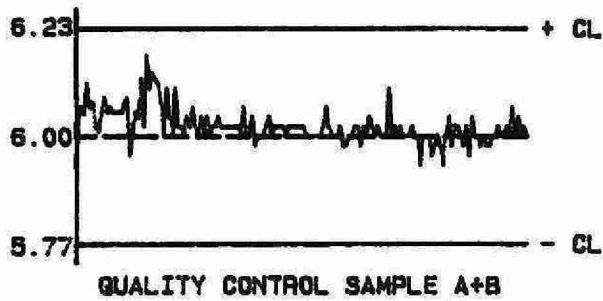
	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
238		0.000 - 0.200	0.0111	19.8
88		0.200 - 0.400	0.0126	4.3
37		0.40 - 1.00	0.078	12.2
23		1.00 - 2.00	0.105	7.9
24		2.00 - 5.00	0.172	5.0
470		Overall	0.058	N/A

OTHER CHECKS:

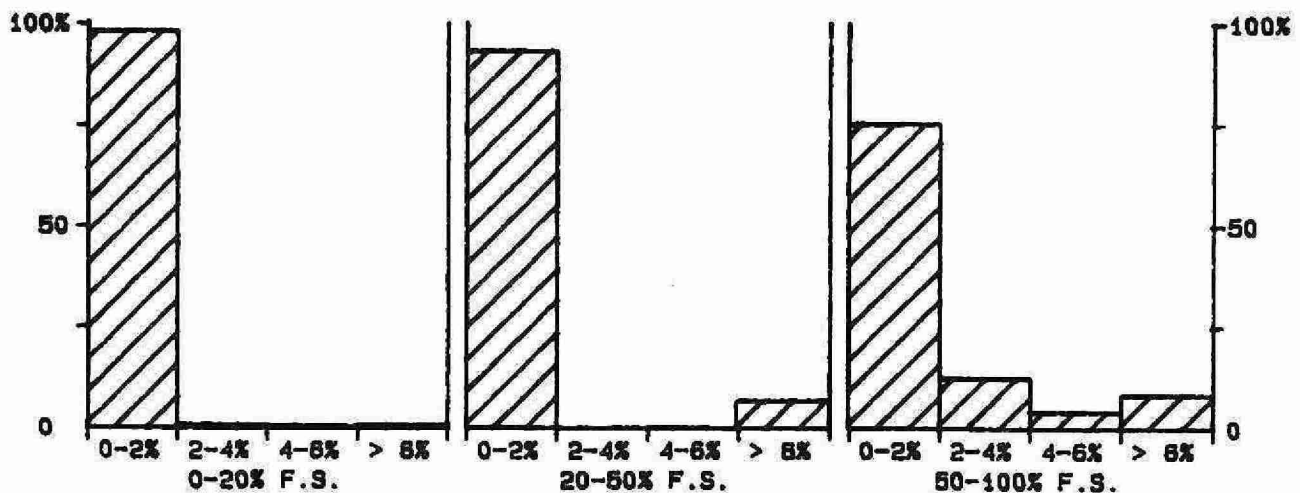
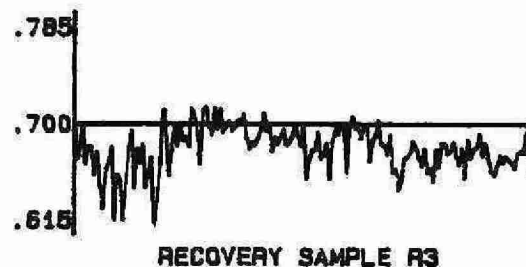
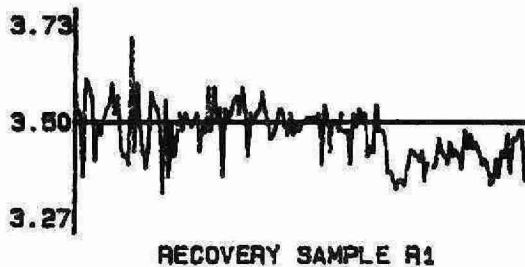
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	159	0.013	0.0209
Digested Blank :	159	0.017	0.0151

QUALITY CONTROL GRAPHS PHOSPHORUS-TOTAL-STKNP (MG/L AS P)

FROM: 02/02/88
TO: 29/12/88



— EXPECTED VALUE
— CONTROL LIMIT (CL)



***** PHOSPHORUS - TOTAL *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 22/03/79
LIS Test Name Code	: PPUT1, PPUT2	Units	: ug/L as P
Work Station Code	: DOP	Unit Code	: 063815
Method Code	: 5926C2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required	: 35 mL
Container	: Specially marked Pyrex culture tubes with Teflon-lined caps

ANALYTICAL PROCEDURE:

After withdrawal of excess volume, digestion reagent is added and samples are autoclaved in sulphuric acid-potassium persulphate media at 121°C for 60 min. The orthophosphate content of the digestate is determined colourimetrically by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.
Approximate absorbance: 0.3 at the full scale level

INSTRUMENTATION:

Autoclave plus basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 0.2	T value: 1
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CALIBRATION:

BL plus 2 undigested standards

CONTROLS:

Calibration	: LTBL plus 4 undigested standards, e.g. QCA
Recovery	: 3 digested BL plus 4 digested standards, e.g. R1
Drift	: BL every 10 samples and BL plus 2 undigested standards every 25 samples

NOTES:

System is calibrated with undigested standards, but sample concentrations are adjusted to reflect day's value for digested blank.

PHOSPHORUS - TOTAL (DOP)
QUALITY CONTROL DATA FROM 05/01/88 TO 30/12/88

Lab: Dorset

Analytical Range: - to 200 ug/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	85	171	168	-3	1.6
b :	85	57	57	0	1.1
a+b :	85	228	225	-3	2.2
a-b :	85	114	110	-4	1.8
c :	95	17.1	16.7	-0.4	0.38
d :	95	5.7	5.7	0.0	0.27
c+d :	95	22.8	22.4	-0.4	0.58
c-d :	95	11.4	11.1	-0.3	0.30

s.d.(AB): SW(within run): 1.3 S(between runs): 1.4 S/Sw: 1.08
s.d.(CD): SW(within run): 0.21 S(between runs): 0.33 S/Sw: 1.55

On any given day the calibration is accepted if the values obtained lie within the ranges:

219 to 237 for A+B
108 to 120 for A-B
19.8 to 25.8 for C+D
9.4 to 13.4 for C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	95	140	144	2.2
r2 :	96	70	72	1.8
r3 :	96	14.0	14.1	0.47
r4 :	94	7.0	7.1	0.28

DUPLICATES:

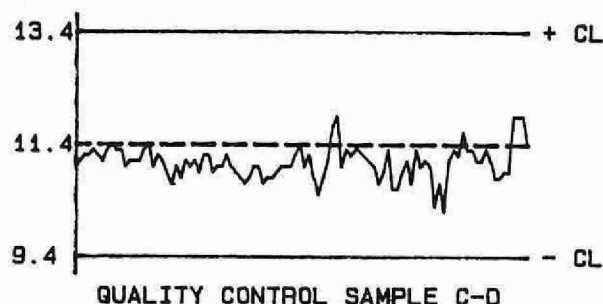
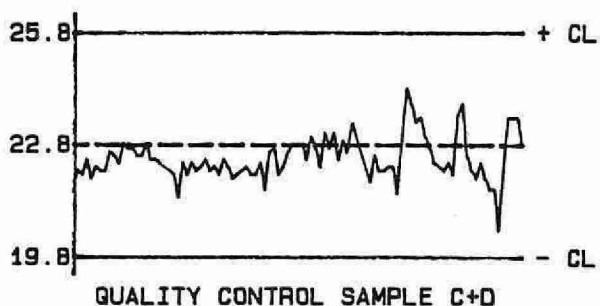
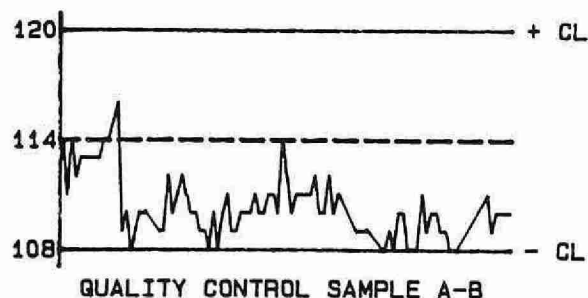
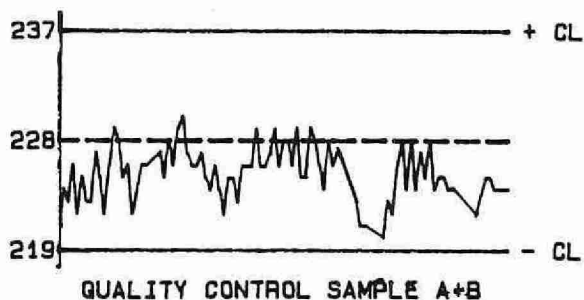
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
83	0.0 - 5.0	0.32	10.5
92	5.0 - 10.0	0.43	6.0
63	10.0 - 20.0	0.70	4.8
33	20 - 50	5.0	17.8
13	50 - 200	3.5	4.0
284	Overall	1.9	N/A

OTHER CHECKS:

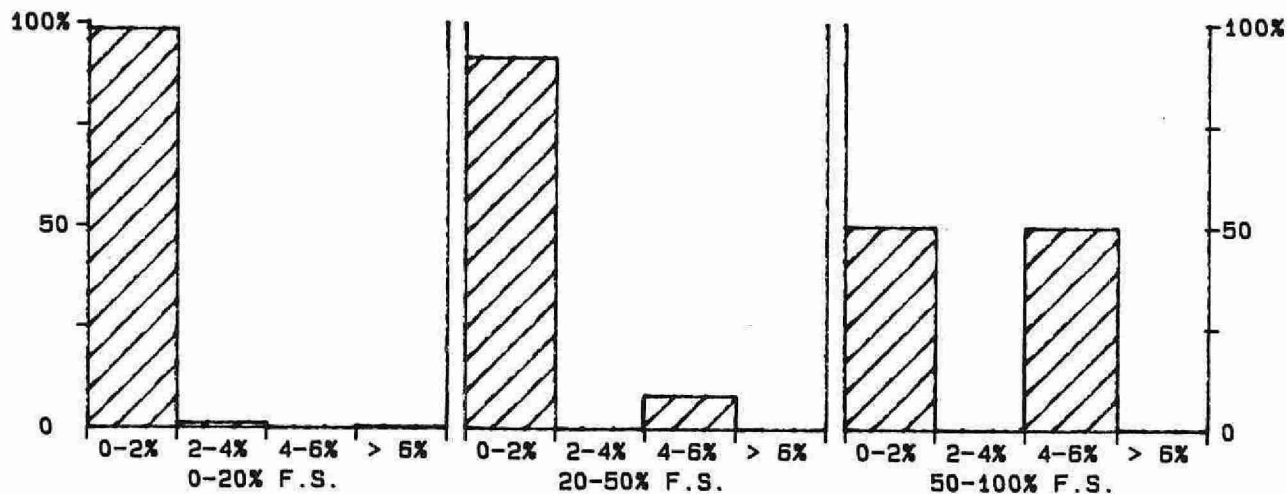
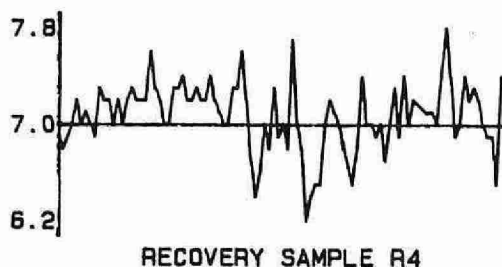
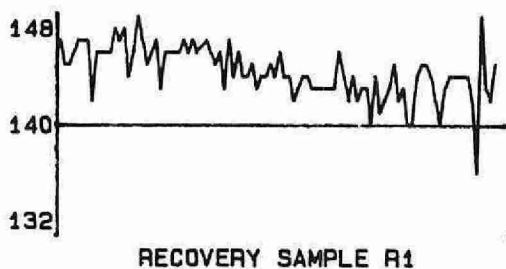
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal.	98	572	26.9
Long Term Blank	98	0.1	0.23
Digested Blank	96	1.1	0.62

QUALITY CONTROL GRAPHS PHOSPHORUS - TOTAL (DOP) (UG/L AS P)

FROM: 05/01/88
TO: 30/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



***** POTASSIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: PRAA	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Precipitation, Throughfall, Filter extracts		

SAMPLING:

Quantity Required	: 5 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm with an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.005	T value: 0.025
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

17/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of Commodore PET for data capture and data reduction. Sample required reduced to 5 mL.

POTASSIUM-PRAA
QUALITY CONTROL DATA FROM 07/01/88 TO 29/12/88

Lab: Atomic Absorption

Analytical Range: - to 1.00 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	74	0.600	0.590	-0.010	0.0070
b :	74	0.100	0.099	-0.001	0.0062
a-b :	74	0.700	0.689	-0.011	0.0100
a-b :	74	0.500	0.491	-0.009	0.0088

s.d.(AB): Sw(within run): 0.0062 S(between runs): 0.0066 S/Sw: 1.06

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.655 to 0.745 for A+B
0.470 to 0.530 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
145	0.000 - 0.100	0.0042	12.9
36	0.100 - 0.200	0.0052	3.8
4	0.20 - 0.50	0.002	0.5
0	0.500 - 0.750	N/A	N/A
3	0.75 - 1.00	0.012	1.4
188	Overall	0.005	N/A

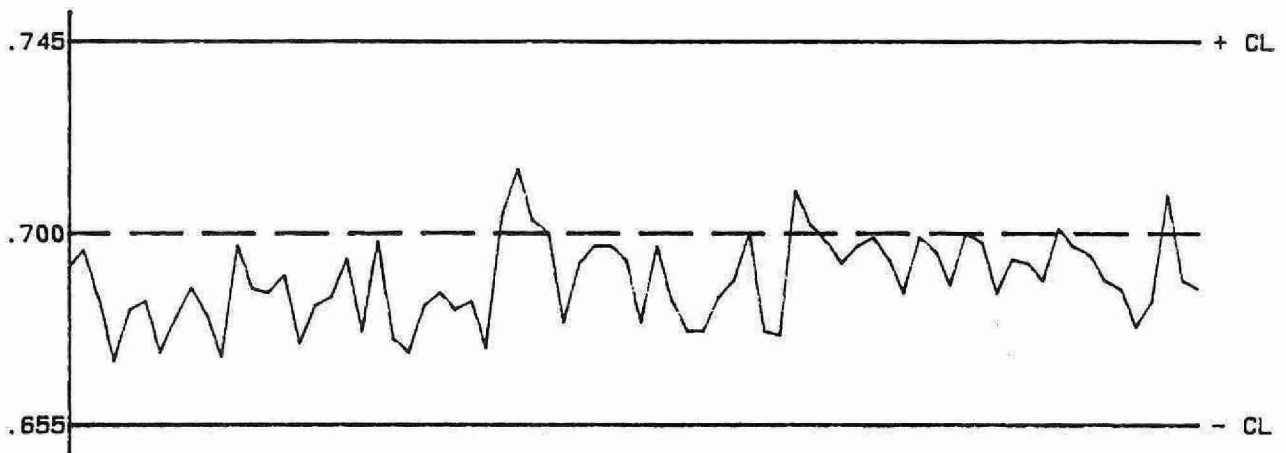
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	32	0.349	0.0818

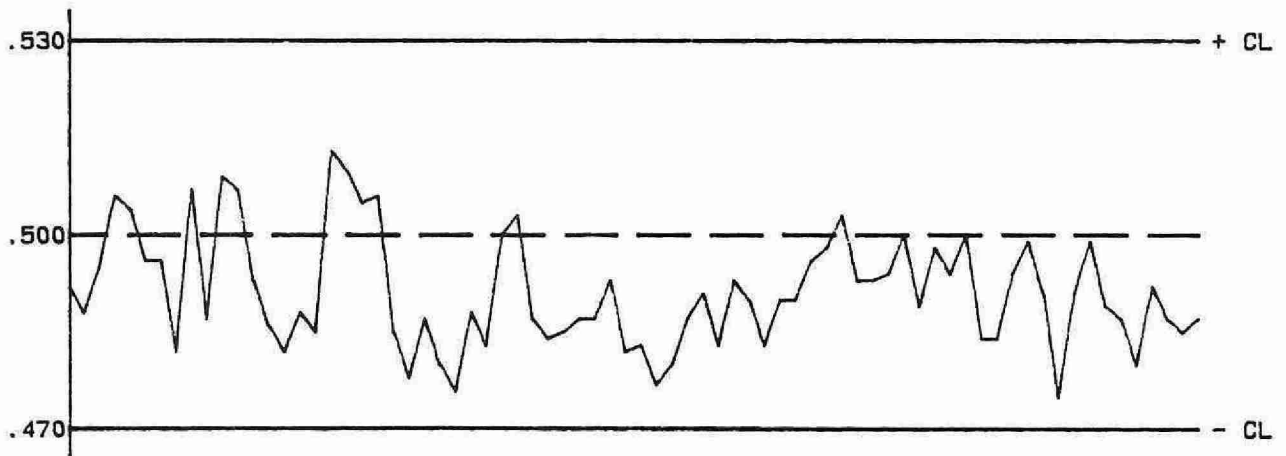
QUALITY CONTROL GRAPHS

POTASSIUM-PRAA (MG/L AS K)

FROM: 07/01/88
TO: 29/12/88

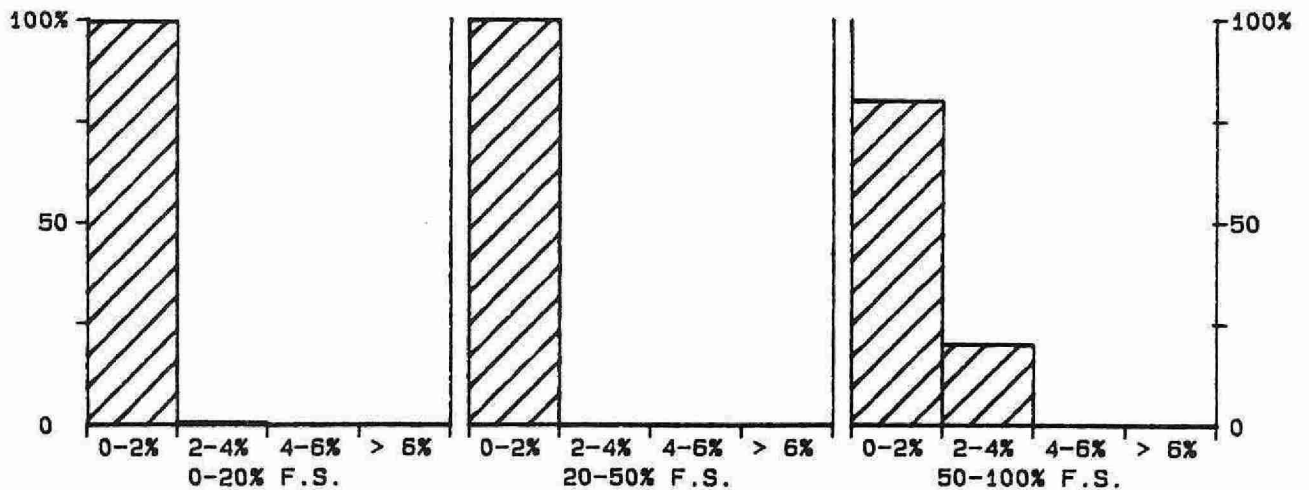


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-286-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1 MG/L AS K

***** POTASSIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: PRAAS	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 5 mL
Container	: Pet Jars only

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm with an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.

Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.01	I value: 0.05
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

17/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of Commodore PET for data capture and data reduction. Sample required reduced to 5 mL.

POTASSIUM-PRAAS
QUALITY CONTROL DATA FROM 20/07/88 TO 30/12/88

Lab: Atomic Absorption

Analytical Range: - to 1.000 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	29	0.80	0.80	-0.00	0.009
b :	29	0.20	0.20	0.00	0.005
a-b :	29	1.00	1.00	-0.00	0.012
a-b :	29	0.60	0.60	-0.00	0.008
c :	29	0.20	0.20	0.00	0.005
d :	29	0.05	0.05	0.00	0.005
c+d :	29	0.25	0.25	0.00	0.003
c-d :	29	0.15	0.15	-0.00	0.007

s.d.(AB): Sw(within run): 0.006 S(between runs): 0.007 S/Sw: 1.29
s.d.(CD): Sw(within run): 0.005 S(between runs): 0.005 S/Sw: 1.01

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.95 to 1.04 for A+B
0.57 to 0.63 for A-B
0.20 to 0.29 for C+D
0.12 to 0.18 for C-D

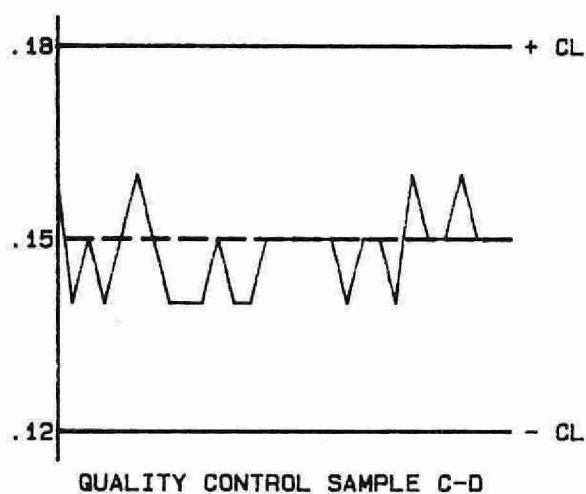
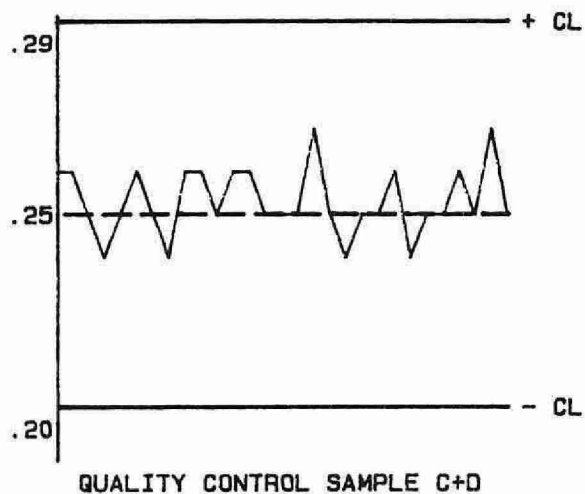
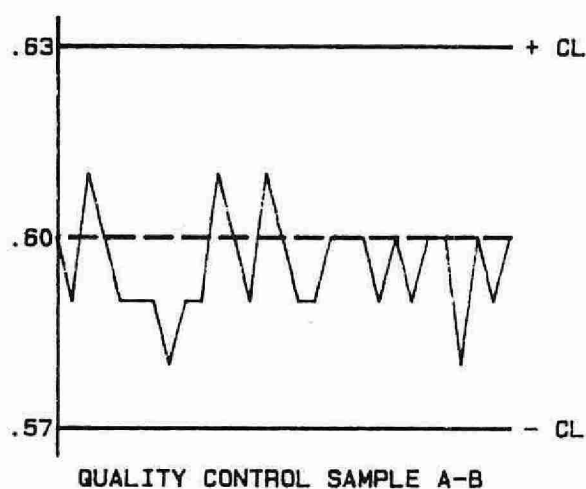
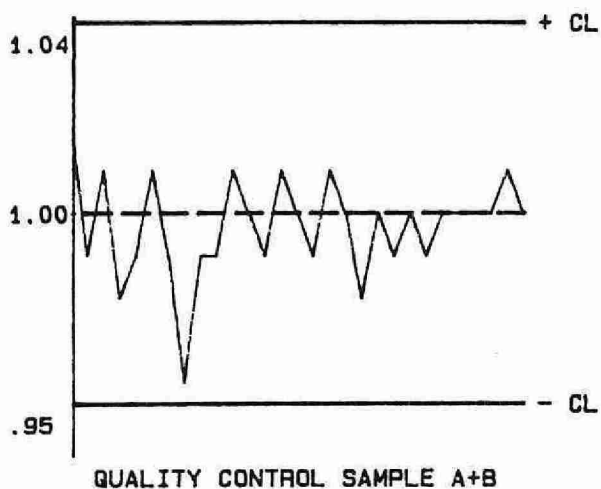
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	5	0.000 - 0.100	0.0029	5.2
	7	0.100 - 0.250	0.0056	3.2
	24	0.250 - 0.500	0.0044	1.0
	33	0.500 - 0.750	0.0059	0.9
	4	0.750 - 1.000	0.0032	0.3
	73	Overall	0.0051	N/A

OTHER CHECKS:

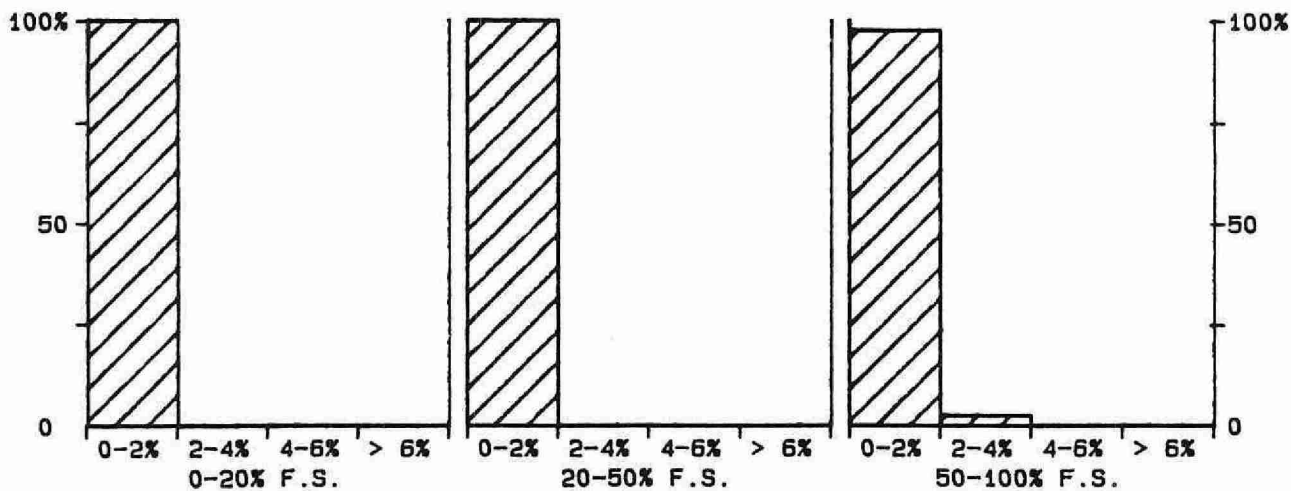
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	27	0.289	0.0537
Long Term Blank :	28	0.00	0.004

QUALITY CONTROL GRAPHS POTASSIUM-PRAAS (MG/L AS K)

FROM: 20/07/88
TO: 30/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



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CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1 MG/L AS K

***** POTASSIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: RMAAS	Unit Code	: 064819
Method Code	: 0905A1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required : 6 mL
Container : Glass or Pet 500 ml Jars

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 768.5 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.923 at the full scale value.

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : LTBL plus 3 standards plus LTB e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

01/12/81 -Calibration range became 5.00 mg/L full scale; second analytical range was dropped.
01/03/84 -Analytical range (RMNAKH) was increased from 5.00 to 10.0 mg/L full scale.
Calibration technique was changed from quadratic to linear interpolation. Sodium is no longer determined simultaneously.
25/09/85 -Calibration range stayed at 10.0 mg/L but second analytical range was dropped.
Concentration of QC solutions were adjusted accordingly. Commodore PET microcomputer controlled system with sample flow injection introduced.
1985 -Three analytical ranges were used during 1985: 1.00, 10.0, and 10.0 mg/L as K full scale.
06/04/87 -Changed full scale to 5 mg/L as K
 Number of cal.standards changed from 10 rto 11
 Number of QC standards changed from 2 to 3 plus LTB

POTASSIUM-RMAAS
QUALITY CONTROL DATA FROM 04/01/88 TO 23/12/88

Lab: Atomic Absorption

Analytical Range: - to 5.00 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	111	4.00	3.97	-0.03	0.048
b :	111	1.00	0.99	-0.01	0.018
a+b :	111	5.00	4.96	-0.04	0.055
a-b :	111	3.00	2.98	-0.02	0.047
c :	111	1.000	0.969	-0.011	0.0169
d :	111	0.250	0.253	0.003	0.0095
c+d :	111	1.250	1.242	-0.008	0.0207
c-d :	111	0.750	0.736	-0.014	0.0179

s.d.(AB): Sw(within run): 0.033 S(between runs): 0.036 S/Sw: 1.09
s.d.(CD): Sw(within run): 0.0127 S(between runs): 0.0137 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.77 to 5.23 for A+B
2.85 to 3.15 for A-B
1.025 to 1.475 for C+D
0.600 to 0.900 for C-D

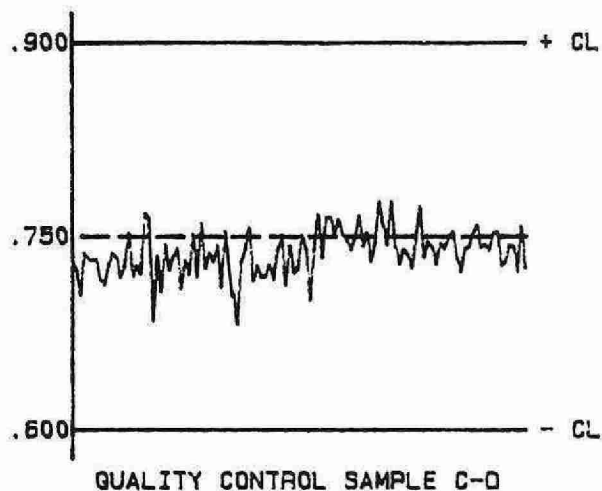
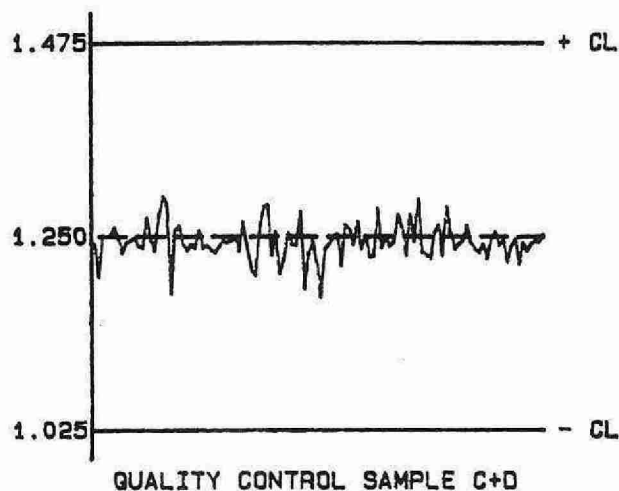
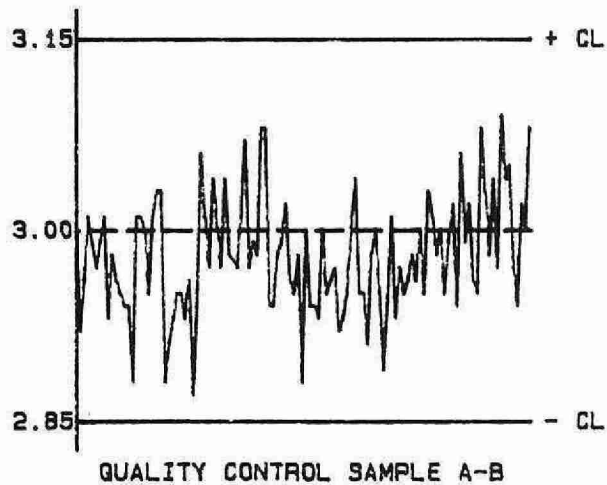
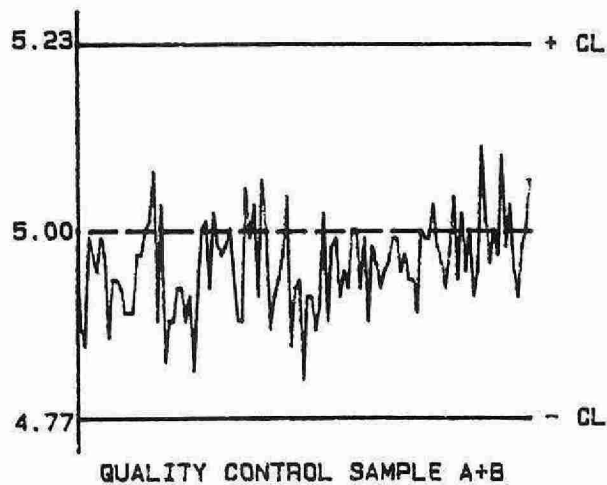
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	33	0.00 - 0.25	0.006	4.6
	56	0.25 - 0.50	0.022	5.6
	66	0.50 - 1.00	0.109	14.5
	110	1.00 - 2.50	0.023	1.5
	30	2.50 - 5.00	0.037	1.0
	295	Overall	0.056	N/A

OTHER CHECKS:

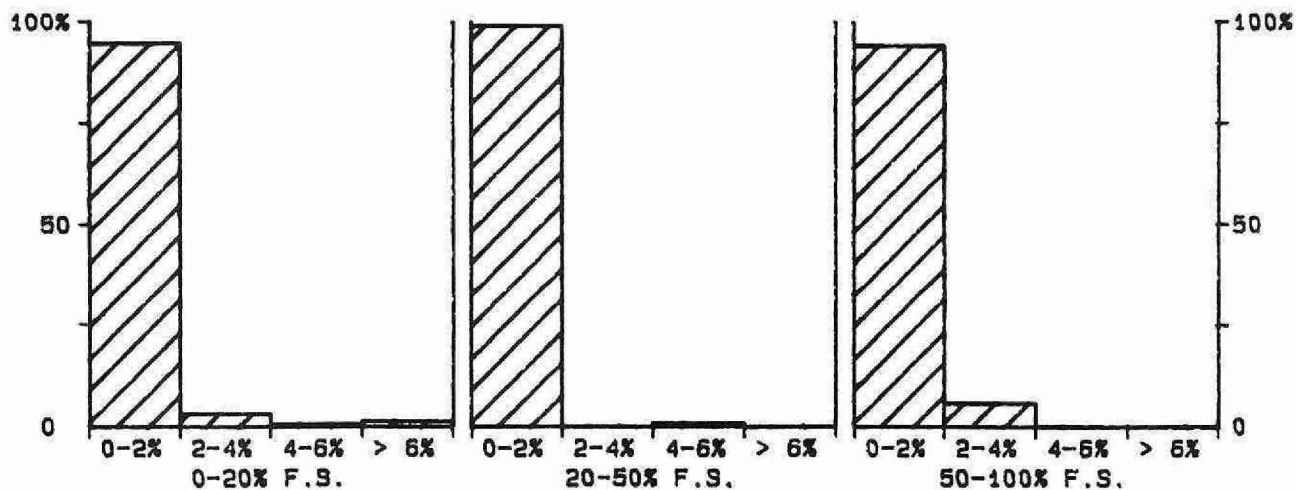
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	104	0.923	0.6606
Long Term Blank :	110	0.00	0.017

QUALITY CONTROL GRAPHS POTASSIUM-RMAAS (MG/L AS K)

FROM: 04/01/88
TO: 29/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-292-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 5 MG/L AS K

***** POTASSIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: WAAS	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial wastes		

SAMPLING:

Quantity Required : 6 mL
Container : Glass or Pet 500 ml Jars

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.16 at full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : LTBL plus 3 standards and LTB e.g. QCA
Drift : BL every 10 standards; 2 standards every 20 samples

MODIFICATIONS:

08/04/86 -All sample classes moved to WAAS workstation. Single analytical range changed from full scale value 40 mg/L to 50 mg/L. Number of calibration standards increased from 2 to 10. Concentration of QC solution adjusted accordingly. Commodore PET microcomputer system control and data handling introduced with linear interpolation of calibration technique. Sample flow injection was introduced.

03/03/87 -Full scale changed to 25 mg/L as K
Number of cal. standards changed from 10 to 11
Number of QC standards changed from 2 to 3 plus LTB

POTASSIUM-WAAS
QUALITY CONTROL DATA FROM 04/01/88 TO 29/12/88

Lab: Atomic Absorption

Analytical Range: - to 25.0 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	115	20.0	20.0	0.0	0.38
b :	115	5.00	5.03	0.03	0.120
a+b :	115	25.00	25.02	0.02	0.435
a-b :	115	15.00	14.95	-0.05	0.352
c :	119	5.00	5.03	0.03	0.142
d :	119	1.25	1.26	0.01	0.054
c+d :	119	6.25	6.29	0.04	0.177
c-d :	119	3.75	3.77	0.02	0.121

s.d.(AB): Sw(within run): 0.25 S(between runs): 0.28 S/Sw: 1.13
s.d.(CD): Sw(within run): 0.086 S(between runs): 0.107 S/Sw: 1.26

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.88 to 26.12 for A+B
14.25 to 15.75 for A-B
5.13 to 7.37 for C+D
3.00 to 4.50 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	132	0.00 - 1.25	0.059	7.2
	98	1.25 - 2.50	0.060	3.4
	44	2.50 - 5.00	0.089	2.6
	24	5.0 - 10.0	0.17	2.1
	11	10.0 - 25.0	0.34	2.3
	309	Overall	0.10	N/A

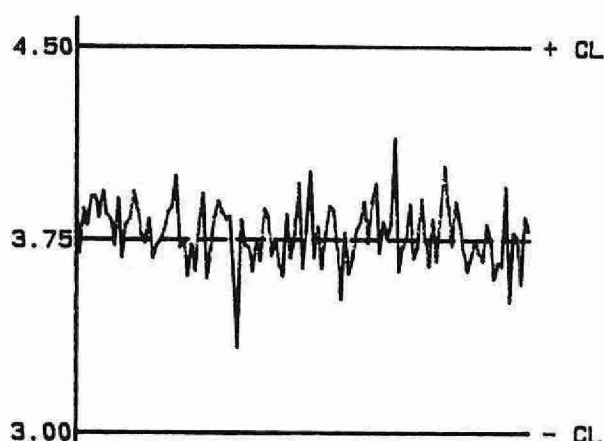
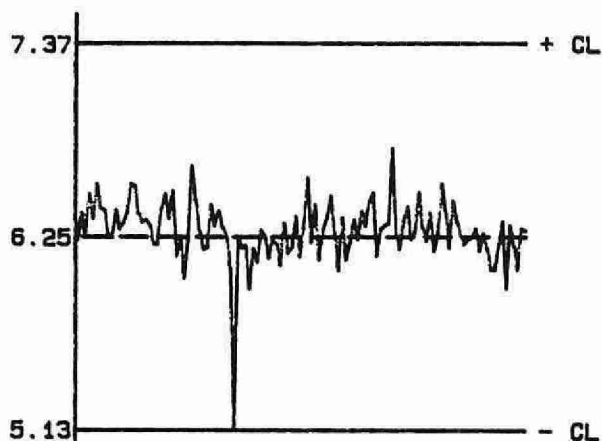
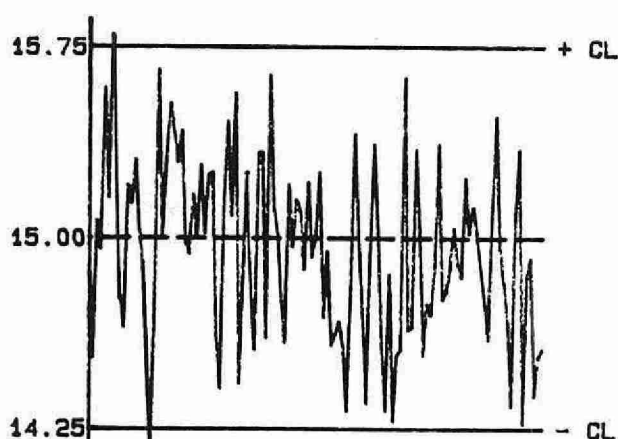
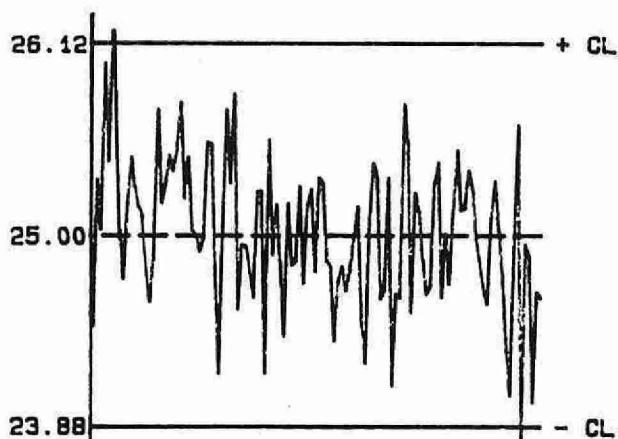
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	107	1.162	0.0804
Long Term Blank :	117	-0.01	0.032

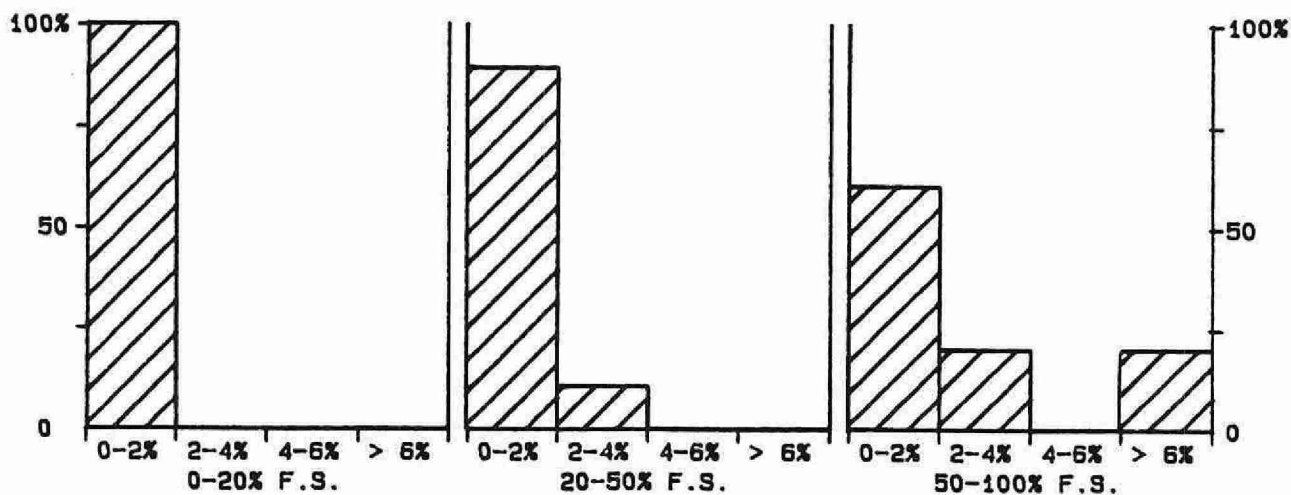
QUALITY CONTROL GRAPHS

POTASSIUM-WAAS (MG/L AS K)

FROM: 04/01/88
TO: 29/12/88



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)



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CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 25 MG/L AS K

*** POTASSIUM ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 18/05/79
LIS Test Name Code	: KKUR	Units	: ug/Filter as K
Work Station Code	: PRLOV	Unit Code	: 361819
Method Code	: 004BA3	Supervisor	: F. Tomassini
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS (workstation PRAA) at 766.5 nm with an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train. Result are converted to ug/filter as K. Sodium is determined on the same extract.

Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

July 81 -Addition of potassium analysis for W40 filters from LoVol filter packs was introduced
17/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of a microcomputer to coordinate sampler, injection, AAS "read", and data reduction. Sample required reduced to 5 mL.

NOTES:

W and T values are those of the PRAA workstation multiplied by 50 to yield ug/filter.

***** POTASSIUM - SOIL (Xsc) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	KKESC	Units	: meq/100 g
Work Station Code	: DOCAION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 6 g dry
Container : Glass jar

SAMPLE PREPARATION:

Samples are air dried,disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for K by AAS at 766.5 nm with an air-acetylene flame. Approximate absorbance: 0.3 at the full scale level.
N.B. Aluminum, calcium, and magnesium are determined simultaneously.

INSTRUMENTATION:

- Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples (run occasionally)
Drift : BBL plus 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/04/81 -Three g sample used for all soil types (6 g previously used for sandy soils)
01/06/86 -Varian AA1275 replaced Perkin Elmer 403

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.
Values for recoveries are unknown - average value used.

POTASSIUM - SOIL (X_{sc})
QUALITY CONTROL DATA FROM 06/01/88 TO 16/11/88

Lab: Dorset Soils

Analytical Range: - to 0.75 meq/100g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	29	0.56	0.55	-0.01	0.013
b :	29	0.19	0.18	-0.01	0.016
a+b :	29	0.75	0.73	-0.02	0.026
a-b :	29	0.38	0.38	0.00	0.014

s.d.(AB): Sw(within run): 0.010 S(between runs): 0.015 S/Sw: 1.47

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.66 to 0.84 for A+B
0.31 to 0.44 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	17	0.10	0.08	0.018
r2 :	27	0.47	0.44	0.035
r3 :	29	0.04	0.04	0.009

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
62	0.00 - 0.15	0.006	11.9
17	0.15 - 0.38	0.021	9.3
7	0.38 - 0.75	0.024	5.0
86	Overall	0.013	N/A

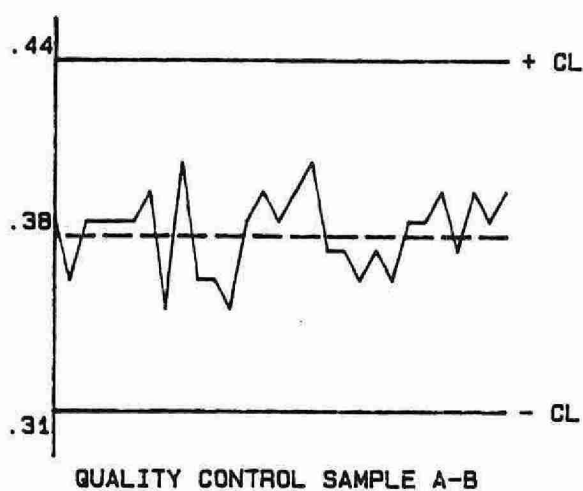
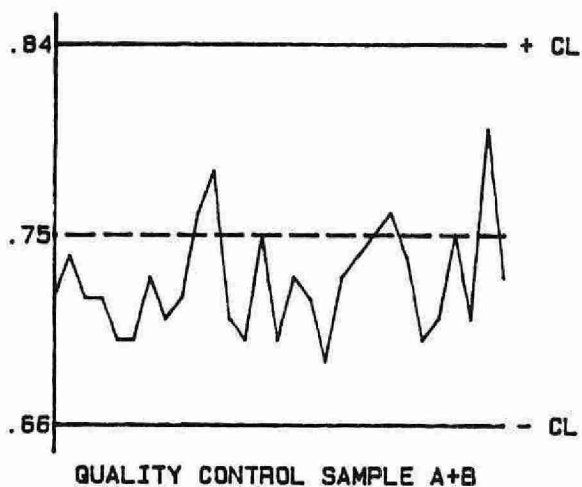
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	29	0.00	0.002

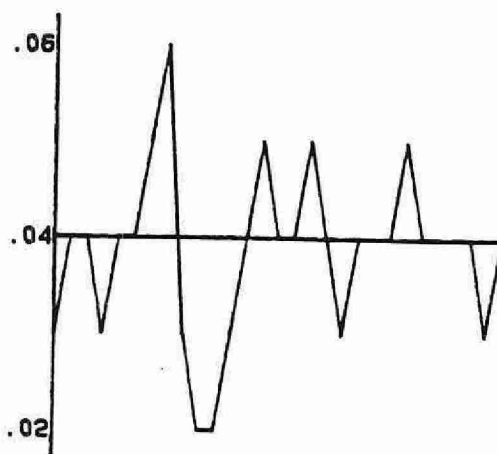
QUALITY CONTROL GRAPHS POTASSIUM - SOIL (XSC) (MEQ/100G)

FROM: 06/01/88

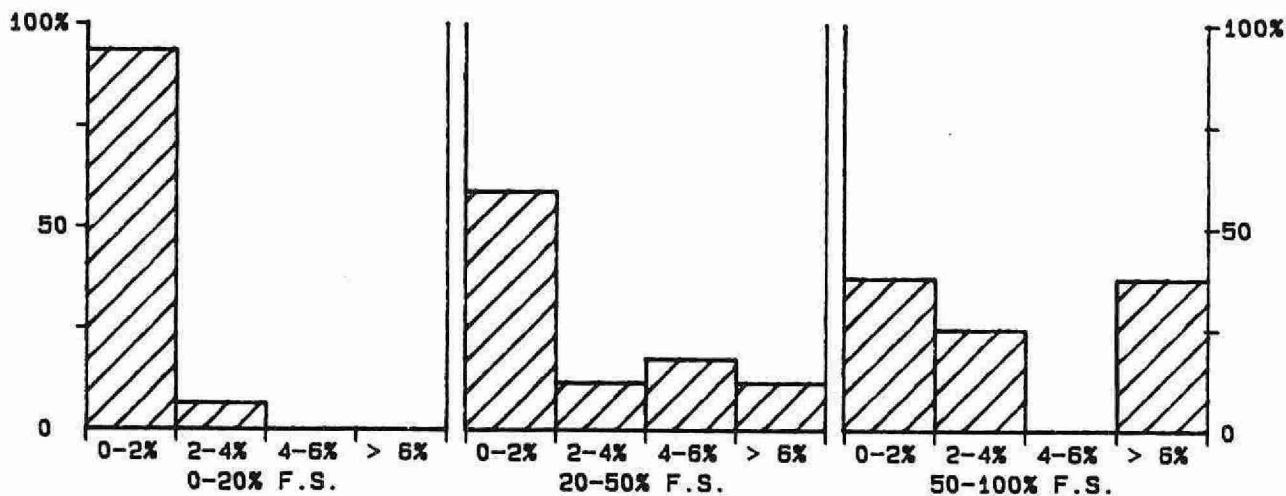
TO: 16/11/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



RECOVERY SAMPLE R3



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CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): .75 MEQ/100G

*** SAND ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: SAND	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass or polystyrene jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved <2 mm.

ANALYTICAL PROCEDURE:

To prevent flocculation a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (>53 um) is removed by wet sieving; the silt and clay fraction is dispersed in a sedimentation cylinder. The percentage of sand in the sample is determined by weighing the dried sieved fraction and expressing that as a percentage by weight of the total (sand, silt and clay) recovered.

INSTRUMENTATION:

-Sartorius 4 place digital balance (model 1201)
-Balance accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1 T value: 5

CALIBRATION:

Balance zero

CONTROLS:

Recovery : 2 long term soil samples representing different soil types
plus round robin CSSC samples (run occasionally).

NOTES:

Two recovery soils are alternated between batches, using their mean values.

SAND
QUALITY CONTROL DATA FROM 22/01/88 TO 10/08/88

Lab: Dorset Soils

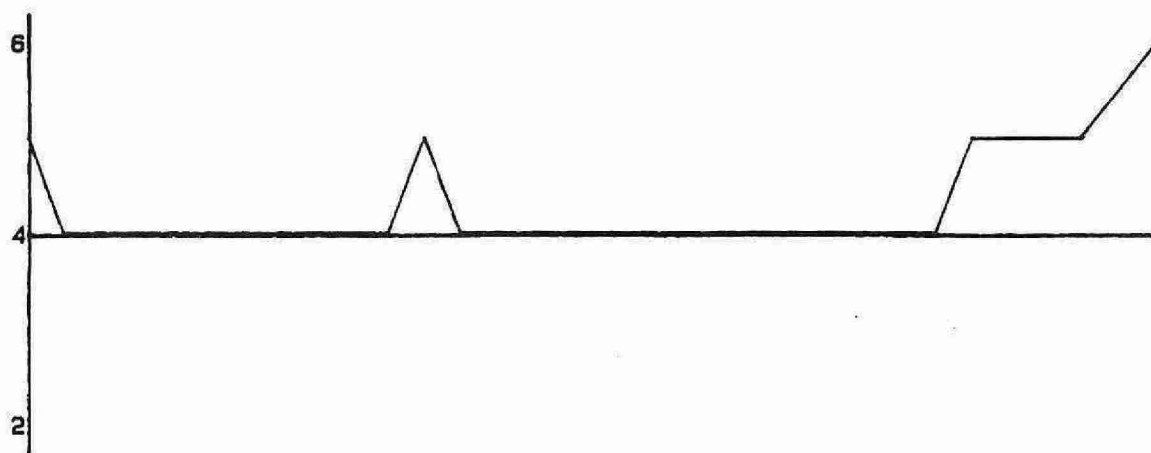
Analytical Range: - to 100 % by wt.

RECOVERIES:	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	31	4	4	0.5
r2 :	31	52	52	3.7

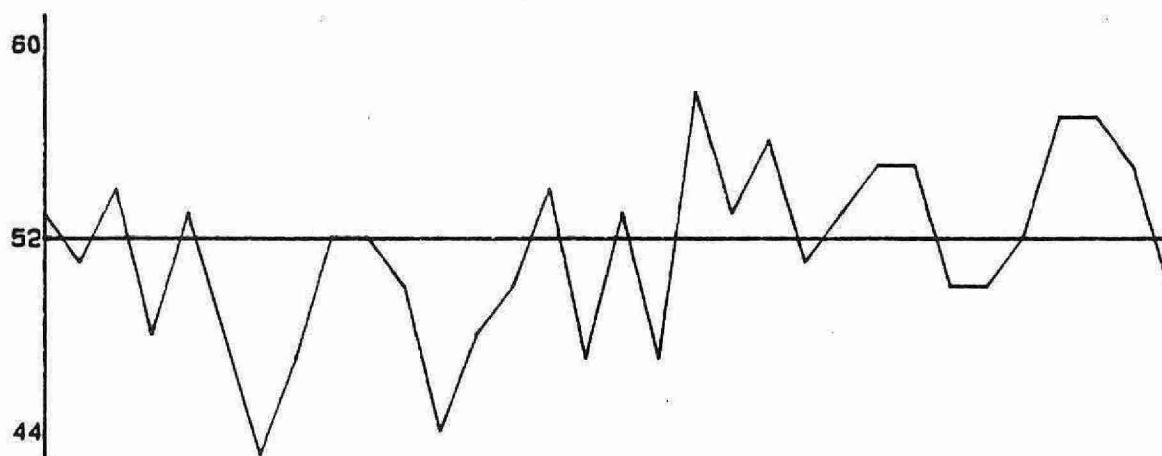
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	6	0 - 20	0.9	7.5
	6	20 - 50	1.3	4.2
	47	50 - 100	1.3	1.6
	59	Overall	1.2	N/A

QUALITY CONTROL GRAPHS SAND (% BY WT.)

FROM: 22/01/88
TO: 10/08/88

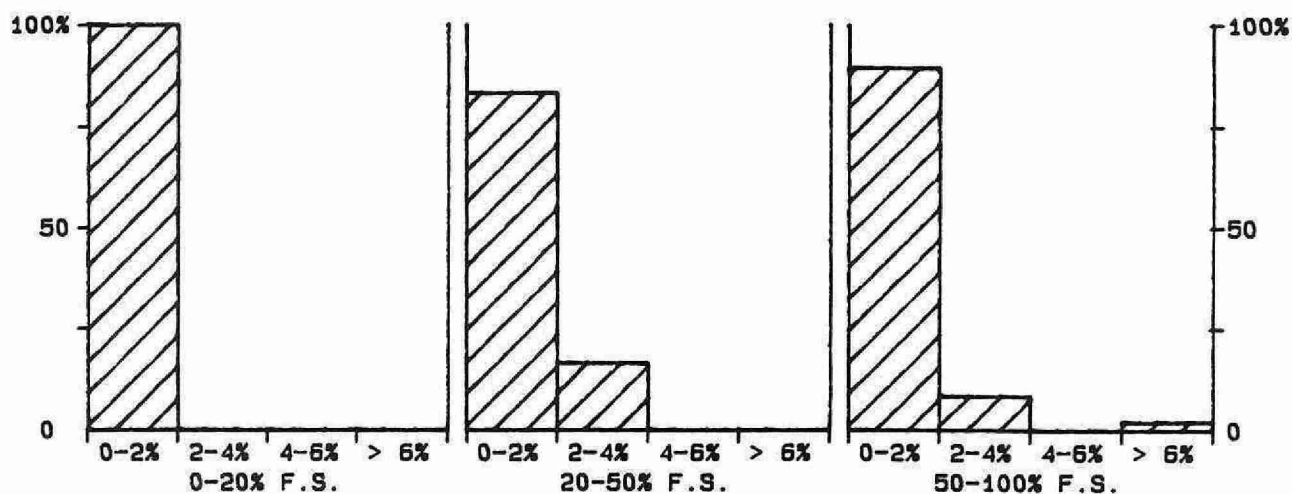


RECOVERY SAMPLE R1



RECOVERY SAMPLE R2

--- EXPECTED VALUE



-302-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 % BY WT.

***** SILICON - REACTIVE SILICATES *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/02/75
LIS Test Name Code	: SIO3UR	Units	: mg/L as Si
Work Station Code	: ROM	Unit Code	: 064814
Method Code	: 001BC1	Supervisor	: M. Rawlings
Sample Type/Matrix	Rivers, Lakes, Precipitation, Soil Extracts, Effluents Domestic Water Supplies, Leachates		

SAMPLING:

Quantity Required : 10 mL
Container : Plastic

ANALYTICAL PROCEDURE:

Reactive silicates are determined by formation of a reduced molybdo-silicate complex at pH 1.6, using ascorbic acid as the reducing agent, and oxalic acid to suppress phosphate interference. Approximate absorbance: 0.7 at the full scale level.
N.B. Dissolved inorganic and dissolved organic carbon are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 660 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; standards every 20 samples

MODIFICATIONS:

04/07/83 -Modules required for Boxed-FIA system were introduced. The number of calibration standards was increased from 2 to 10. The analytical rate was tripled. Concentrations of QC standards adjusted accordingly.
27/03/85 -Silicon analytical range was changed from 0-5.00 mg/L to 0-10.00 mg/L. First three months' data were omitted because they were not comparable with the later ones.
12/03/86 -Boxed-FIA system discontinued. Basic air-segmented continuous flow system implemented. Test transferred from RMSICL to ROM workstation. HP9920 microcomputer system introduced. Calibration standards changed from 10 to 7.

NOTES:

Calibration standard is a hydrate: $\text{Na}_2\text{SiO}_3 \cdot 9\text{H}_2\text{O}$.

SILICON-ROM
QUALITY CONTROL DATA FROM 04/01/88 TO 22/12/88

Lab: Colourimetry

Analytical Range: - to 10.00 mg/L as Si

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	163	8.00	7.95	-0.05	0.085
b :	163	2.00	1.98	-0.02	0.029
a+b :	163	10.00	9.93	-0.07	0.103
a-b :	163	6.00	5.97	-0.03	0.074
c :	164	2.00	1.98	-0.02	0.029
d :	164	0.50	0.50	-0.00	0.017
c+d :	164	2.50	2.48	-0.02	0.042
c-d :	164	1.50	1.48	-0.02	0.023

s.d.(AB): Sw(within run): 0.052 S(between runs): 0.064 S/Sw: 1.21
s.d.(CD): Sw(within run): 0.016 S(between runs): 0.024 S/Sw: 1.46

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.70 to 10.30 for A+B
5.80 to 6.20 for A-B
2.32 to 2.68 for C+D
1.38 to 1.62 for C-D

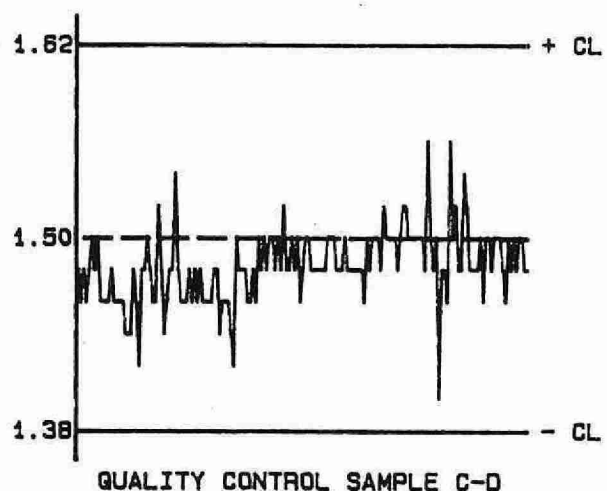
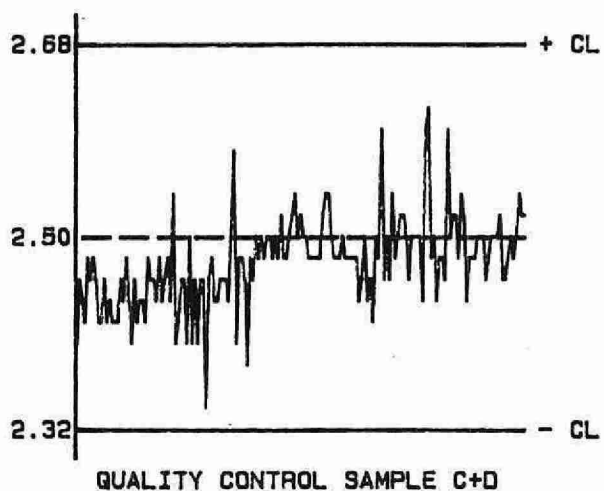
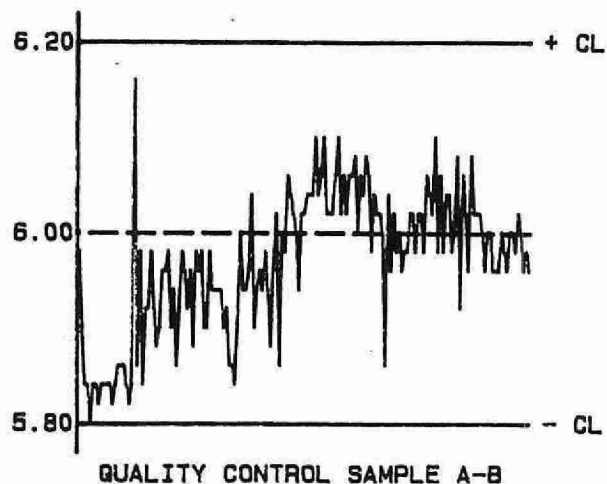
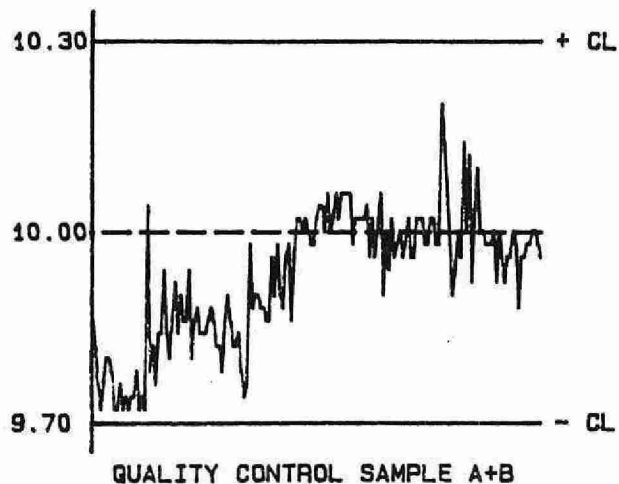
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	168	0.00 - 1.00	0.026	6.7
	64	1.00 - 2.00	0.025	1.8
	128	2.00 - 5.00	0.053	1.6
	104	5.00 - 10.00	0.106	1.5
	465	Overall	0.060	N/A

OTHER CHECKS:

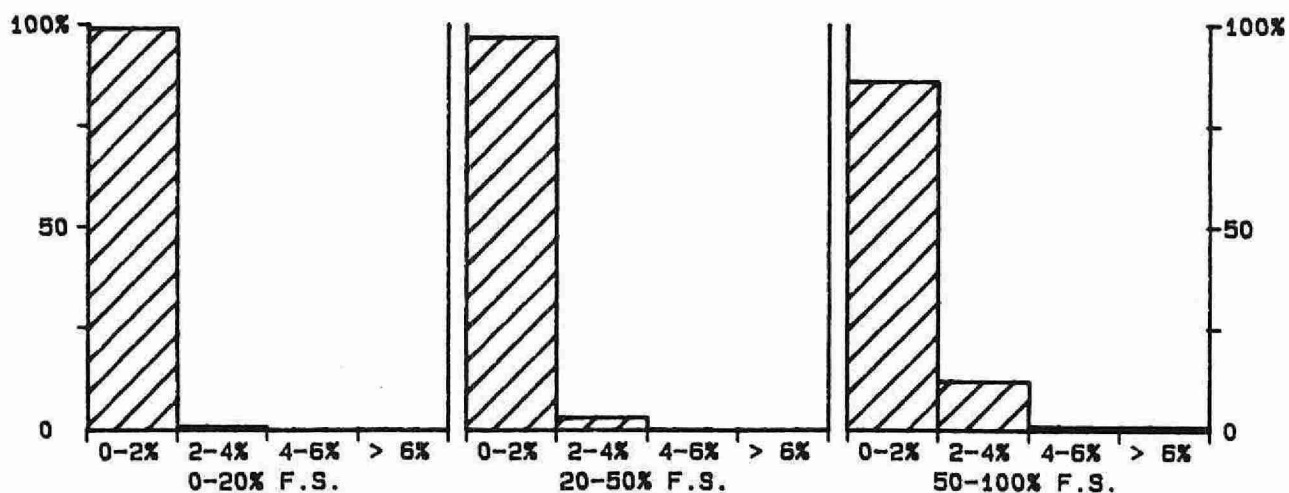
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	159	0.00	0.014

QUALITY CONTROL GRAPHS SILICON-ROM (MG/L AS SI)

FROM: 04/01/88
TO: 22/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10 MG/L AS SI

***** SILT *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: SILT	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass or polystyrene jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

To prevent flocculation a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (>53 um) is removed by wet sieving; the silt and clay fraction is dispersed in a sedimentation cylinder. The percentage of silt in the sample is based on the settling velocities of spherical particles by the application of Stokes Law.

INSTRUMENTATION:

-Sartorius 4 place digital balance (model 1201)
-Balance accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1 T value: 5

CALIBRATION:

Balance zero

CONTROLS:

Recovery : 2 long term soil samples representing different soil types plus
round robin CSSC samples (run occasionally).

NOTES:

Two recovery soils are alternated between batches, using their mean values.

SILT
QUALITY CONTROL DATA FROM 22/01/88 TO 08/08/88

Lab: Dorset Soils

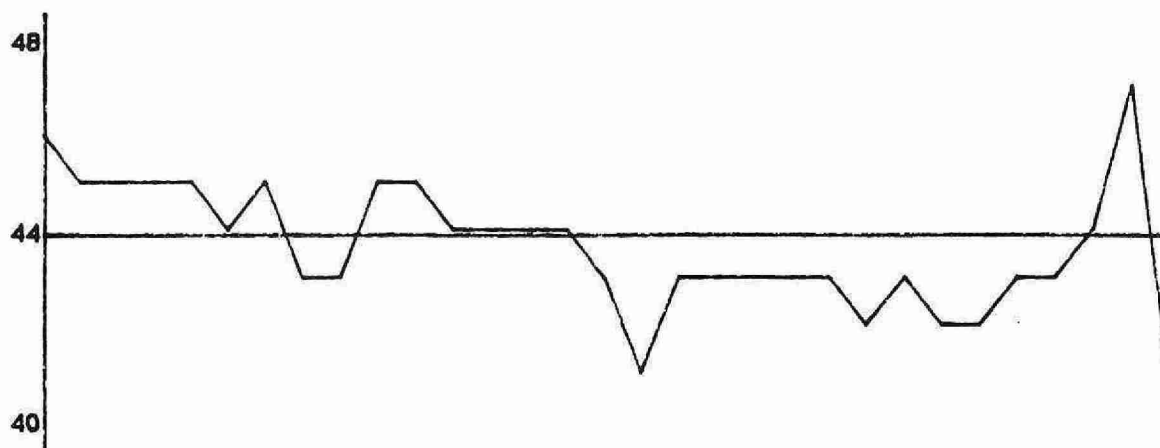
Analytical Range: - to 100 % by wt.

RECOVERIES:		Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
		-----	-----	-----	-----
r1	:	31	44	44	1.4
r2	:	31	47	47	3.5

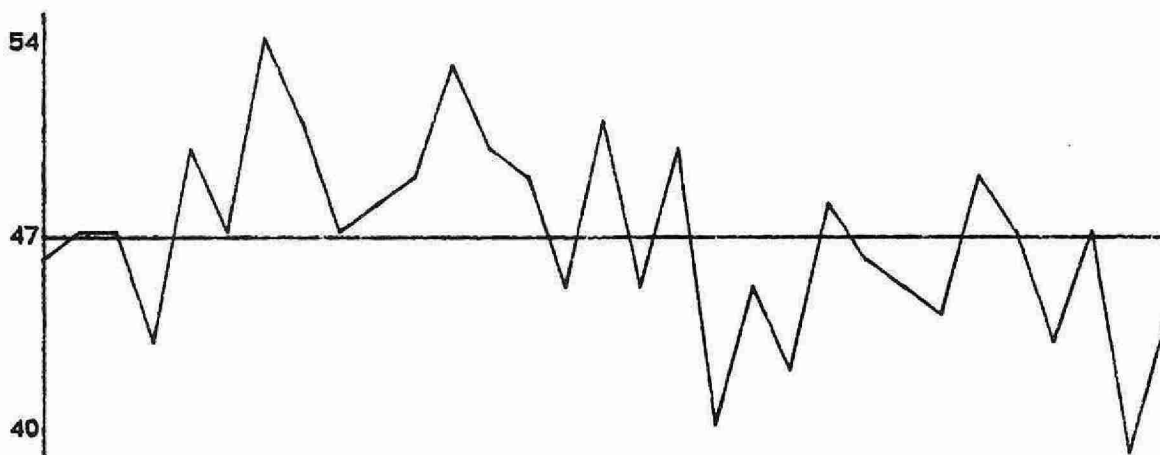
DUPLICATES:		Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
		-----	-----	-----	-----
		26	0 - 20	0.9	10.1
		24	20 - 50	1.5	4.9
		9	50 - 100	1.2	1.8
		59	Overall	1.2	N/A

QUALITY CONTROL GRAPHS SILT (% BY WT.)

FROM: 22/01/88
TO: 08/08/88

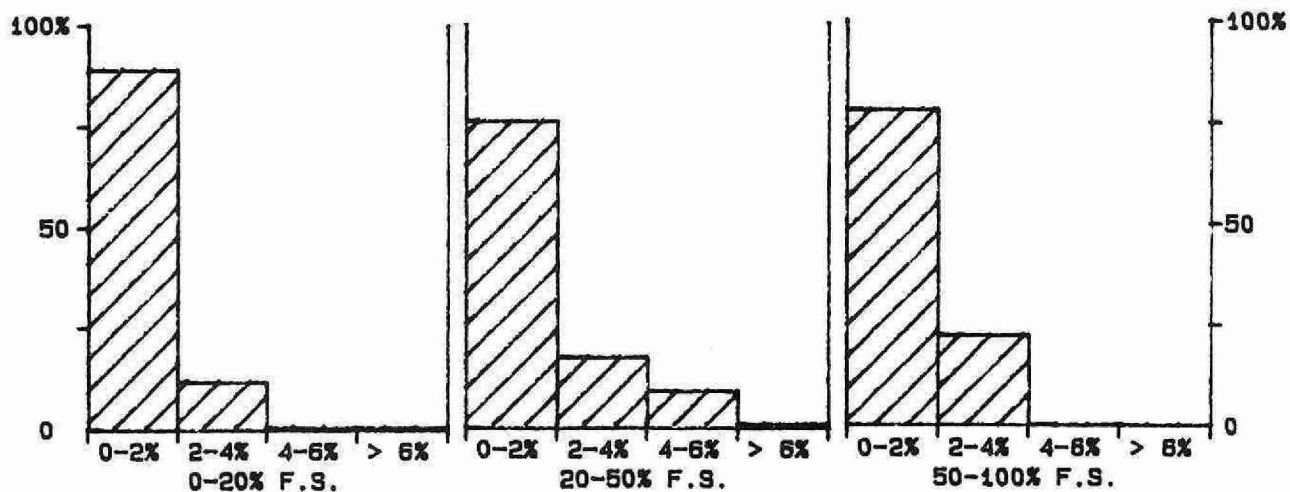


RECOVERY SAMPLE R1



RECOVERY SAMPLE R2

--- EXPECTED VALUE



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 % BY WT.
-308-

***** SODIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: PRAA	Unit Code	: 064811
Method Code	: 002EA1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Precipitation, Throughfall, Filter extracts		

SAMPLING:

Quantity Required	: 5 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm with an air-acetylene flame. Potassium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.005	T value: 0.025
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

17/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of Commodore PET microcomputer for data capture and data reduction. Sample required reduced to 5 mL.

SODIUM-PRAA
QUALITY CONTROL DATA FROM 07/01/88 TO 29/12/88

Lab: Atomic Absorption

Analytical Range: - to 1.00 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	73	0.600	0.600	-0.000	0.0103
b :	73	0.100	0.102	0.002	0.0046
a+b :	73	0.700	0.701	0.001	0.0128
a-b :	73	0.500	0.498	-0.002	0.0096

s.d.(AB): Sw(within run): 0.0068 S(between runs): 0.0080 S/Sw: 1.18

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.655 to 0.745 for A+B
0.470 to 0.530 for A-B

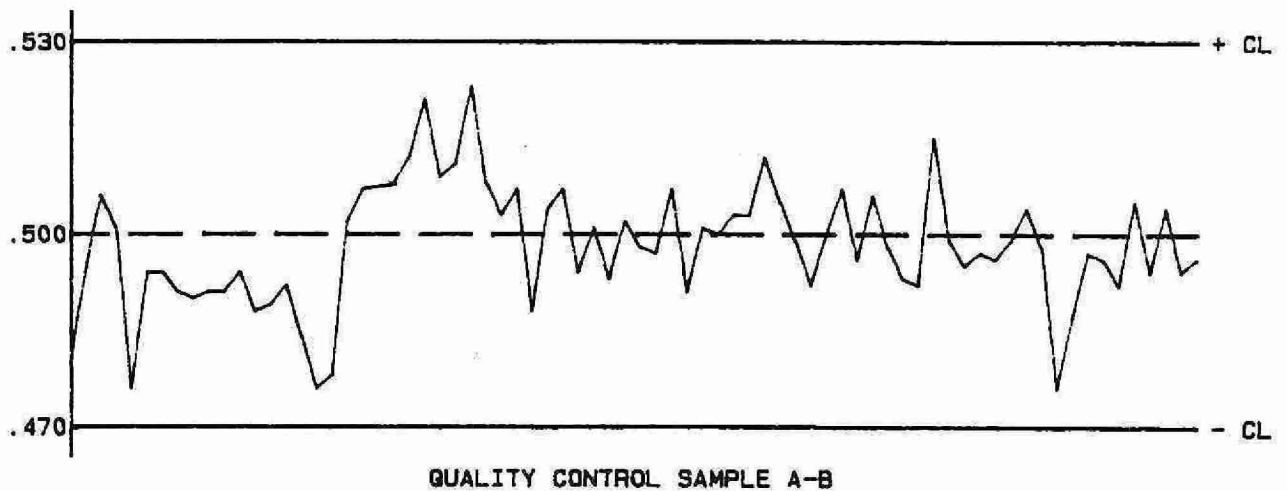
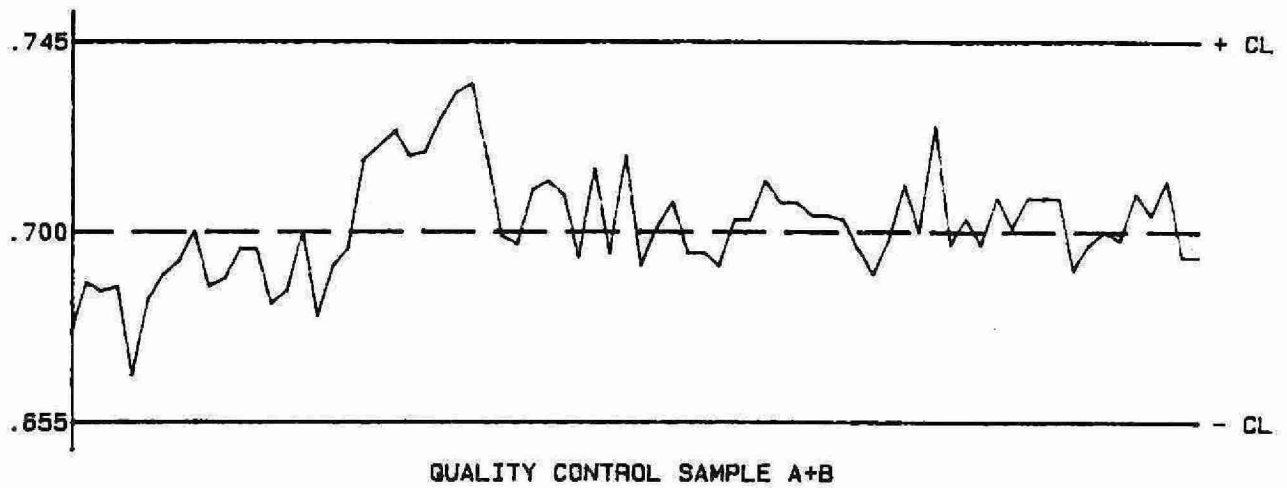
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	140	0.000 - 0.100	0.0049	14.2
	32	0.100 - 0.200	0.0040	3.0
	19	0.200 - 0.500	0.0048	1.5
	3	0.500 - 0.750	0.0142	2.5
	1	0.75 - 1.00	N/A	N/A
	195	Overall	0.005	N/A

OTHER CHECKS:

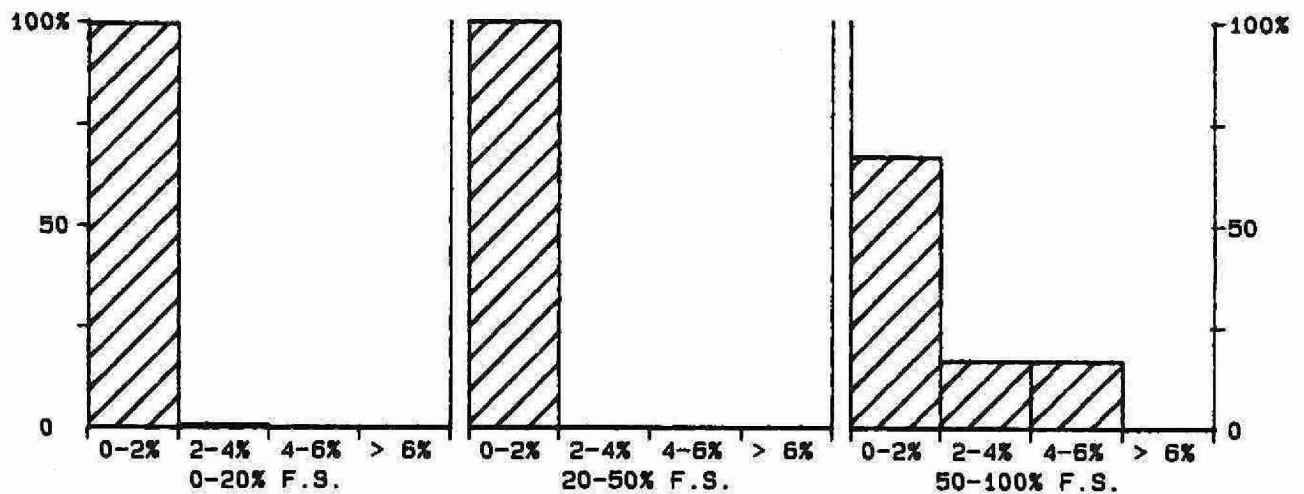
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	34	0.376	0.0717

QUALITY CONTROL GRAPHS SODIUM-PRAA (MG/L AS NA)

FROM: 07/01/88
TO: 29/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-311-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1 MG/L AS NA

***** SODIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: PRAAS	Unit Code	: 064811
Method Code	: 002EA1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required : 5 mL
Container : Pet Jars only

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm with an air-acetylene flame. Potassium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

17/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of Commodore PET microcomputer for data capture and data reduction. Sample required reduced to 5 mL.

SODIUM-PRAAS
QUALITY CONTROL DATA FROM 20/07/88 TO 30/12/88

Lab: Atomic Absorption

Analytical Range: - to 4.000 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	29	3.20	3.20	-0.00	0.041
b :	29	0.80	0.80	0.00	0.010
a+b :	29	4.00	4.00	-0.00	0.045
a-b :	29	2.40	2.39	-0.01	0.040
c :	29	0.80	0.80	0.00	0.010
d :	29	0.20	0.20	0.00	0.014
c+d :	29	1.00	1.00	0.00	0.017
c-d :	29	0.60	0.60	-0.00	0.018

s.d.(AB): Sw(within run): 0.023 S(between runs): 0.030 S/Sw: 1.06
s.d.(CD): Sw(within run): 0.013 S(between runs): 0.012 S/Sw: 0.36

On any given day the calibration is accepted if the values obtained lie within the ranges:

3.92 to 4.16 for A+B
2.28 to 2.52 for A-B
0.62 to 1.18 for C+D
0.48 to 0.72 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	2	0.000 - 0.400	0.0055	1.6
	36	0.400 - 1.000	0.0081	1.1
	12	1.000 - 2.000	0.0145	1.1
	20	2.000 - 3.000	0.0230	0.8
	8	3.000 - 4.000	0.0160	0.4
	78	Overall	0.0150	N/A

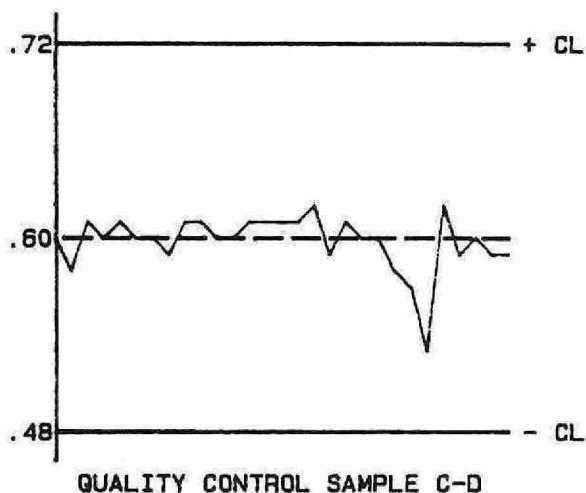
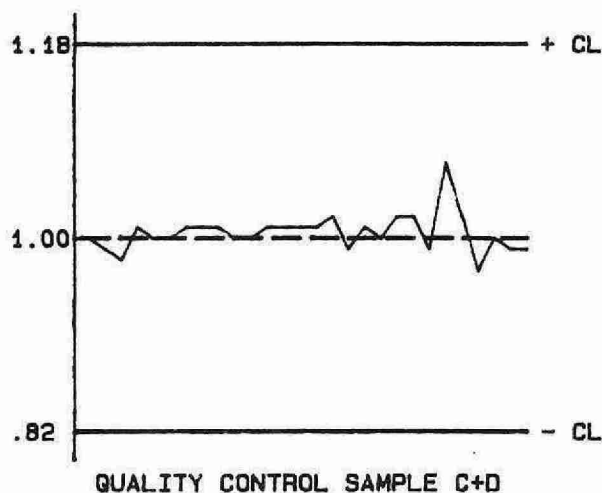
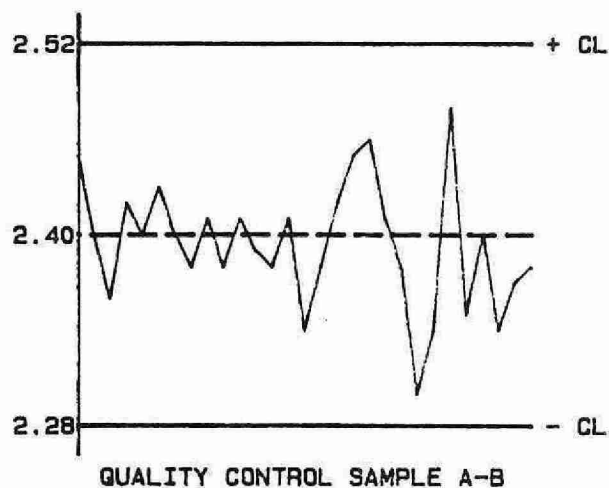
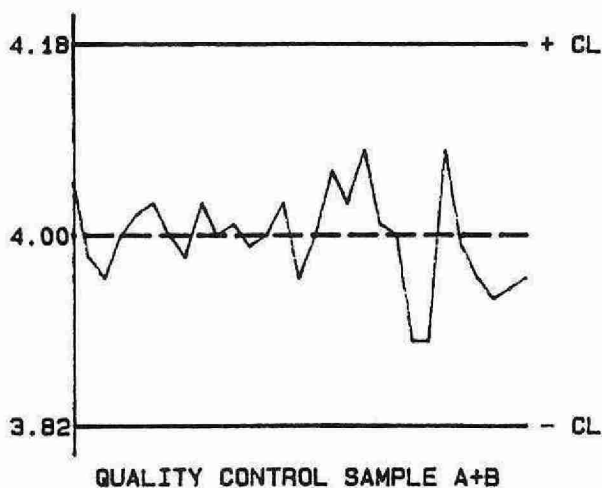
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	28	1.195	0.0587
Long Term Blank :	29	0.00	0.008

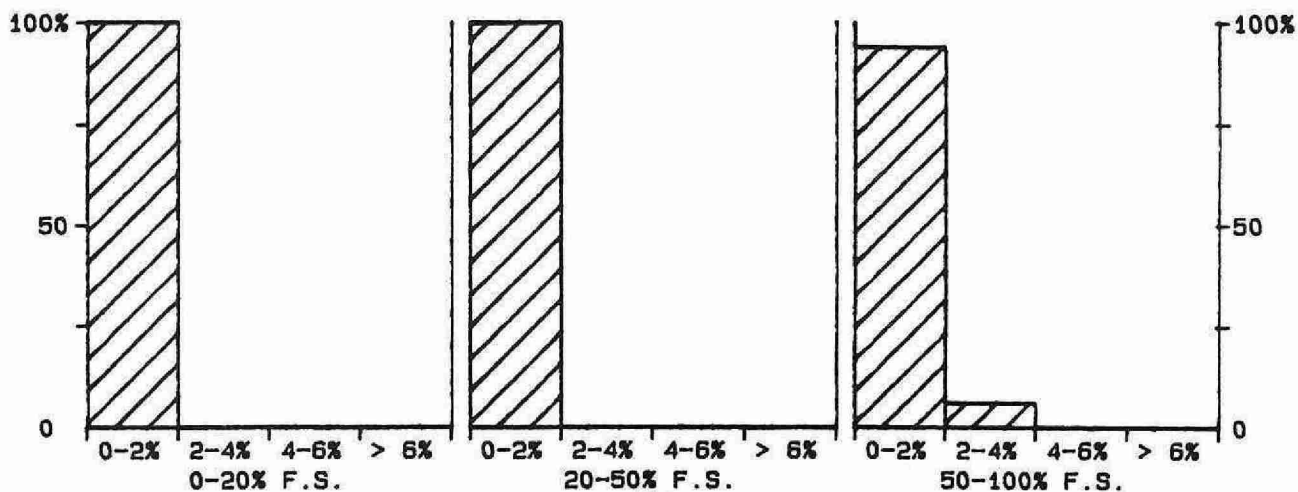
QUALITY CONTROL GRAPHS

SODIUM-PRAAS (MG/L AS NA)

FROM: 20/07/88
TO: 30/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 4 MG/L AS NA

***** SODIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: RMAAS	Unit Code	: 064811
Method Code	: 0905A1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required : 6 mL
Container : Glass or Pet 500 ml Jars

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.16 at the full scale value.

INSTRUMENTATION:

Automated flow injection absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : LTBL plus 3 standards plus LTB e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

01/12/81 -Calibration range became 10.0 mg/L full scale; second analytical range was dropped.
01/03/84 -Analytical range (RMNAKH) was increased from 10.0 to 20.0 mg/L full scale.
Calibration technique was changed from quadratic to linear interpolation. Potassium is no longer determined simultaneously.
25/09/85 -Calibration range remains at 20.0 mg/L full scale but second analytical range was dropped. Concentrations of QC standards were adjusted accordingly. Commodore PET microcomputer controlled system with sample flow injection introduced.
1985 -Three analytical ranges were used during 1985: 2.00, 20.0, and 20.0 mg/L as Na full scale.
06/04/87 -Full scale remained at 20 mg/L as Na but number of cal.standards changed from 10 to 11
Number of QC standards changed from 2 to 3 plus one LTB

SODIUM-RMAAS
QUALITY CONTROL DATA FROM 04/01/88 TO 23/12/88

Lab: Atomic Absorption

Analytical Range: - to 20.00 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	114	15.00	15.85	-0.15	0.219
b :	114	4.00	3.98	-0.02	0.064
a+b :	114	20.00	19.83	-0.17	0.240
a-b :	114	12.00	11.87	-0.13	0.215
c :	114	4.00	3.98	-0.02	0.064
d :	114	1.000	1.004	0.004	0.0392
c+d :	114	5.000	4.982	-0.018	0.0762
c-d :	114	3.000	2.975	-0.025	0.0729

s.d.(AB): Sw(within run): 0.152 S(between runs): 0.181 S/Sw: 1.06
s.d.(CD): Sw(within run): 0.052 S(between runs): 0.053 S/Sw: 1.03

On any given day the calibration is accepted if the values obtained lie within the ranges:

19.10 to 20.90 for A+B
11.40 to 12.60 for A-B
4.100 to 5.900 for C+D
2.400 to 3.600 for C-D

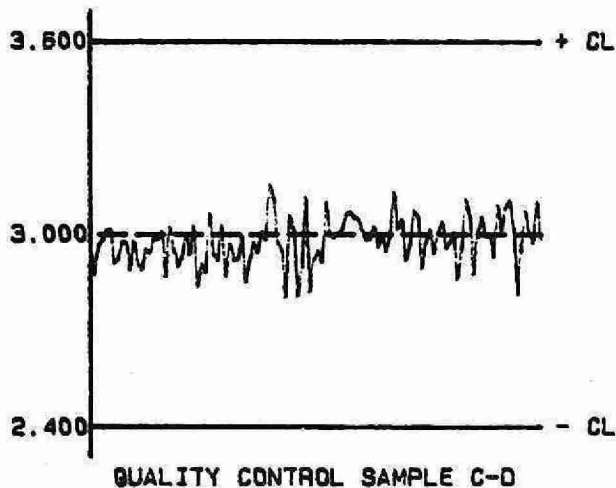
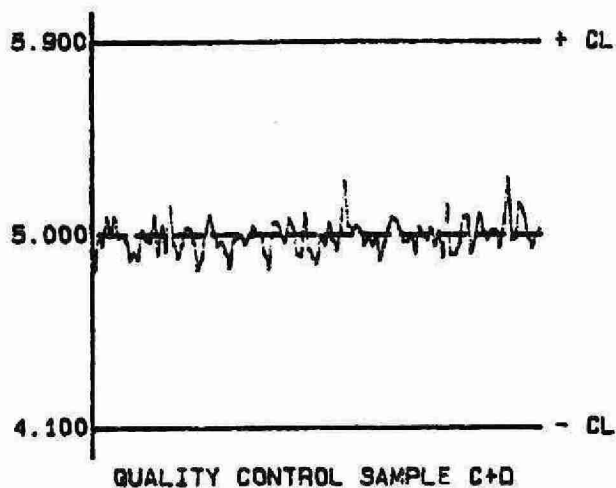
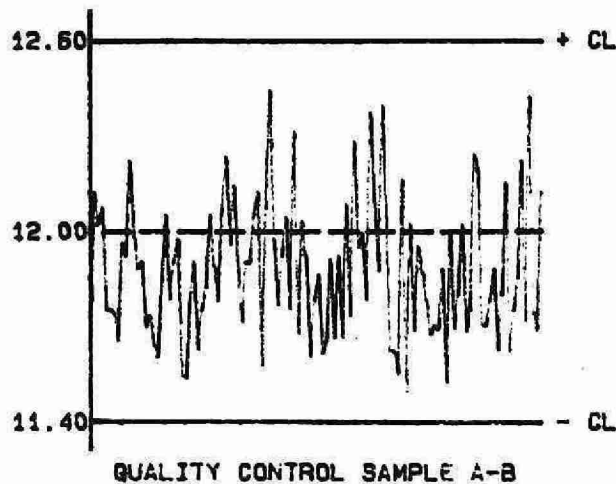
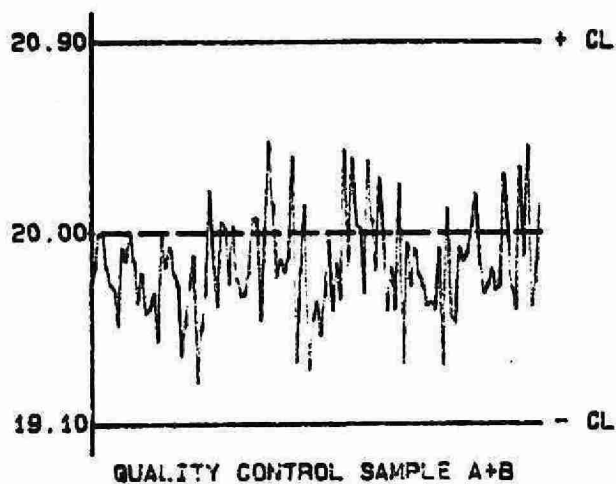
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	74	0.00 - 1.00	0.029	4.4
	68	1.00 - 2.00	0.045	3.2
	53	2.00 - 5.00	0.143	4.1
	47	5.00 - 10.00	0.098	1.4
	27	10.00 - 20.00	0.169	1.2
	269	Overall	0.096	N/A

OTHER CHECKS:

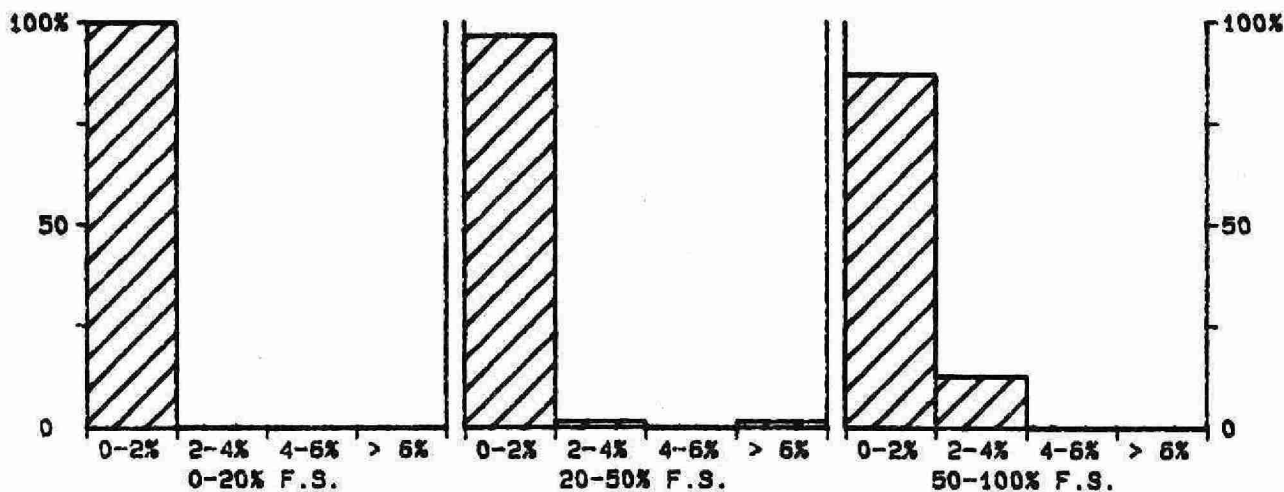
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	108	1.160	0.0687
Long Term Blank :	109	0.01	0.026

QUALITY CONTROL GRAPHS SODIUM-RMAAS (MG/L AS NA)

FROM: 04/01/88
TO: 29/12/88



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 20 MG/L AS NA

***** SODIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: WAAS	Unit Code	: 064811
Method Code	: 001EA1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Pet 500 ml Jars

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm using an air-acetylene flame. Potassium is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.21 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, and LTB e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

08/04/86 -All sample classes moved to WAAS workstation. Single analytical range changed from full scale value 200 mg/L to 100 mg/L. Number of calibration standards increased from 2 to 10. Concentration of QC solutions adjusted accordingly. Commodore PET microcomputer system control and data handling introduced with linear interpolation of calibration technique. Sample flow injection was introduced.

03/03/88 -Full scale remains at 100 mg/l Na

Number of cal. standards changed from 10 to 11

Number of QC standards changed from 2 to 3 plus LTB

SODIUM-WAAS
QUALITY CONTROL DATA FROM 04/01/88 TO 29/12/88

Lab: Atomic Absorption

Analytical Range: - to 100.0 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Avg. Concn Measured	Avg. Bias	Standard(1) Deviation
a :	130	80.0	80.1	0.1	1.24
b :	130	20.00	20.12	0.12	0.425
a-b :	130	100.00	100.27	0.27	1.405
a-b :	130	60.00	60.03	0.03	1.205
c :	130	20.00	20.12	0.12	0.425
d :	130	5.00	5.07	0.07	0.178
c-d :	130	25.00	25.19	0.19	0.432
c-d :	130	15.00	15.06	0.06	0.428

s.d.(AB): Sw(within run): 0.85 S(between runs): 0.93 S/Sw: 1.09
s.d.(CD): Sw(within run): 0.303 S(between runs): 0.326 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

95.50 to 104.50 for A+B
57.00 to 63.00 for A-B
20.50 to 29.50 for C+D
12.00 to 18.00 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	73	0.00 - 5.00	0.256	8.3
	67	5.00 - 10.00	0.385	5.1
	102	10.0 - 25.0	0.73	4.7
	47	25.0 - 50.0	0.74	2.0
	28	50.0 - 100.0	1.27	1.8
	317	Overall	0.67	N/A

OTHER CHECKS:

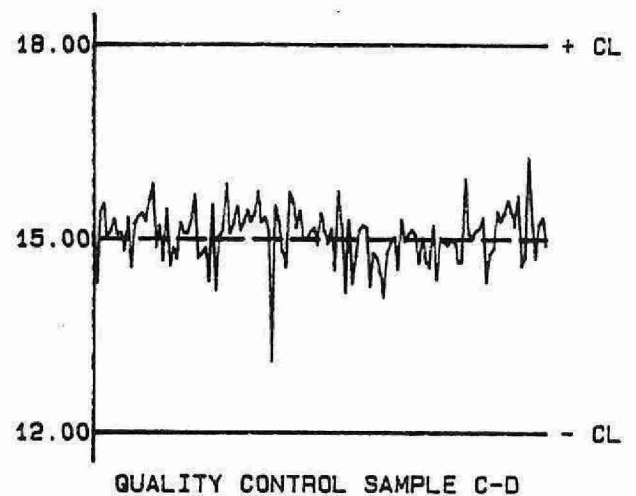
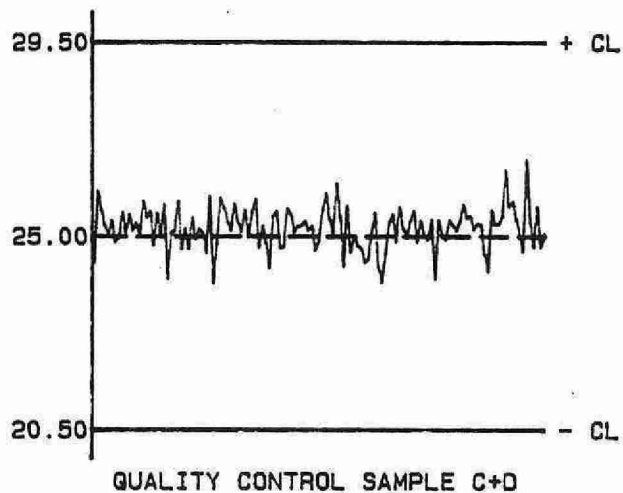
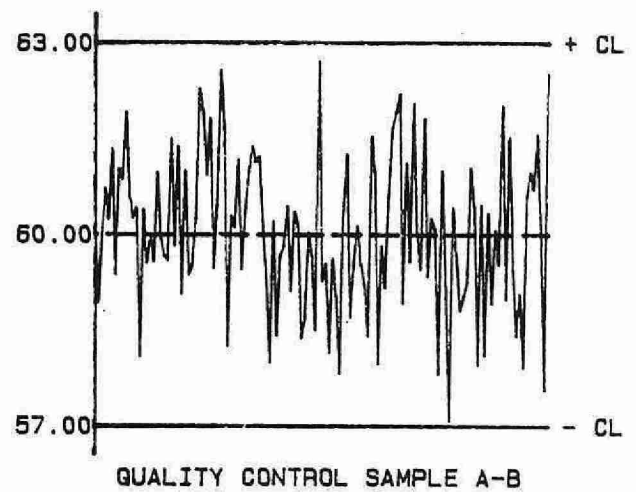
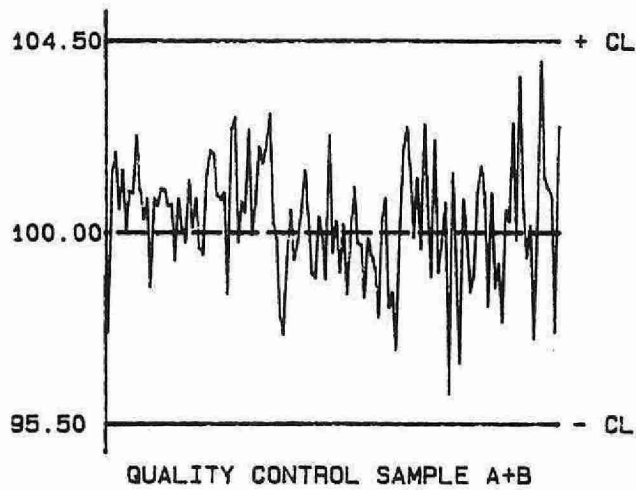
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	121	1.203	0.0524
Long Term Blank :	128	-0.01	0.102

QUALITY CONTROL GRAPHS

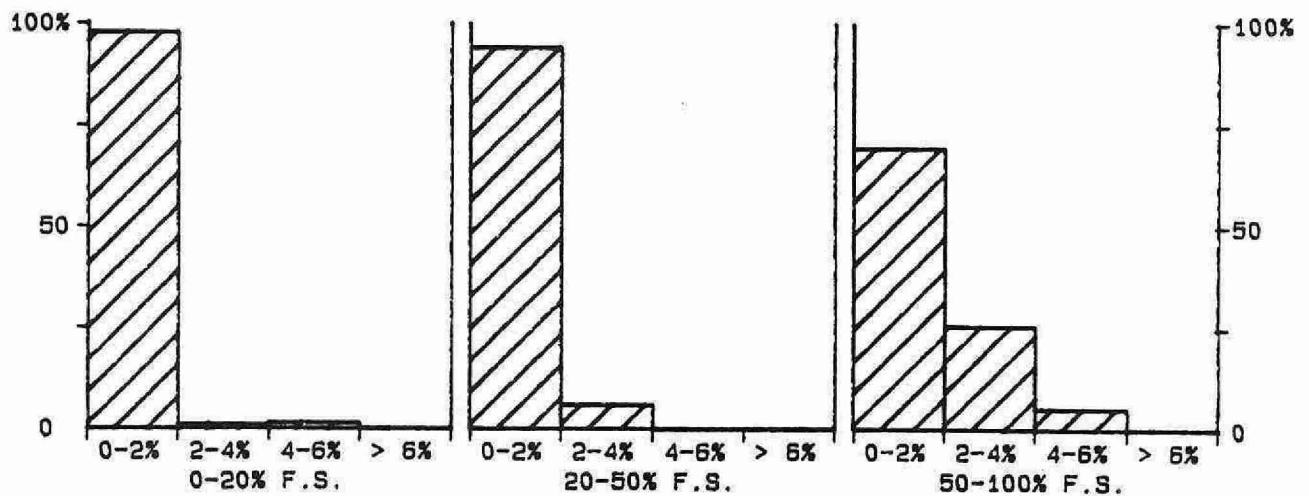
SODIUM-WAAS (MG/L AS NA)

FROM: 04/01/88

TO: 29/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



*** SODIUM ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 18/05/79
LIS Test Name Code	: NAUR	Units	: ug/Filter as Na
Work Station Code	: PRLOV	Unit Code	: 361811
Method Code	: 004AA3	Supervisor	: F. Tomassini
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS (workstation PRAA) at 766.5 nm with an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train. Result are converted to ug/filter as Na. Potassium is determined on the same extract. Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

July 81 -Addition of potassium analysis for W40 filters from LoVol filter packs was introduced.
17/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of a microcomputer to coordinate sampler, injection, AAS "read", and data reduction. Sample required reduced to 5 mL.

NOTES:

W and T values are those of the PRAA workstation multiplied by 50 to yield ug/filter.

***** SOLIDS - DISSOLVED *****

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced	: Before '61
LIS Test Name Code	: RSF	Units	: mg/L
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 106AB4	Supervisor	: P. Campbell
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Surface Waters, Leachates		

SAMPLING:

Quantity Required : 125 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Sample is filtered under moderate suction through a Whatman 934AH glass fibre filter. 50 or 100 mL of filtrate is pipetted into a preweighed Teflon dish, dried at 103-105°C, and stored in a desiccator for at least 24 hours. After reweighing the dissolved residue or solids content is calculated by difference. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

-Balance (4/5-decimal places), drying oven, suction filtration apparatus, Teflon dishes
-Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

Balance zero and 1 built-in calibration weight.

CONTROLS:

Calibration : 2 S class weights, e.g. QCA
Recovery : LTBL plus 2 standards, e.g. R1
Drift : Balance zero is checked at least every 20 dishes.

MODIFICATIONS:

15/01/82 -Microcomputer control was introduced
01/07/85 -Teflon dishes replaced ceramic dishes and aliquot volume increased to 100 mL for most samples.
01/12/86 -Correction factor for dish tare weights was included in calculation, based on variations of a standard sealed vessel.

NOTES:

As the same two balances are used for all solids analyses in the Sewage/Industrial laboratory, the calibration control data are only listed once: in the Solids-Total report.

SOLIDS - DISSOLVED - RSF
QUALITY CONTROL DATA FROM 02/01/88 TO 24/11/88

Lab: Solids and 800

Analytical Range: - to 3000 mg/L

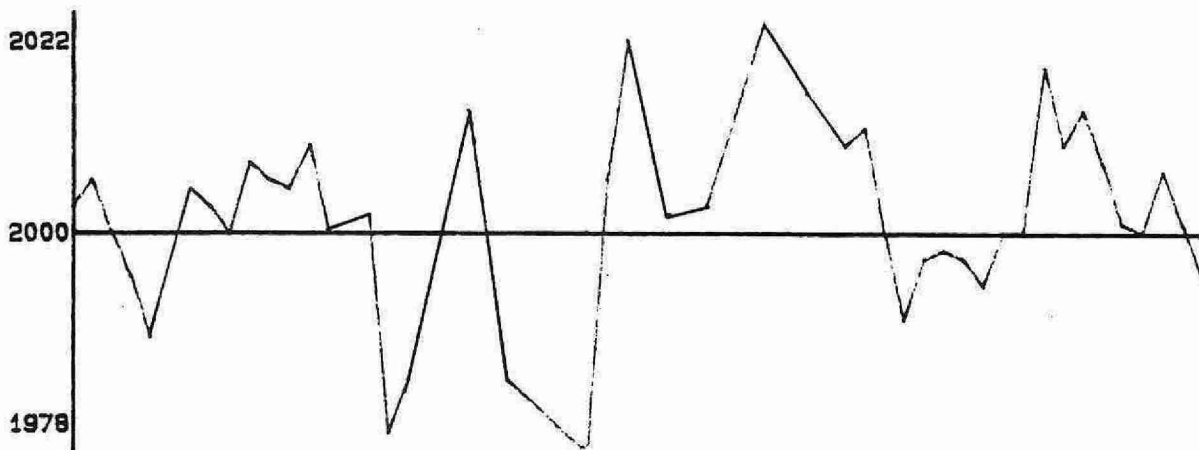
RECOVERIES:	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	44	2000	2004	17.1
r2 :	44	500	500	6.0

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	3	0.0 - 200.0	3.68	4.4
	9	200 - 400	13.6	4.1
	18	400 - 600	12.3	2.5
	25	600 - 1000	20.3	2.6
	12	1000 - 3000	26.5	1.9
	67	Overall	18.6	N/A

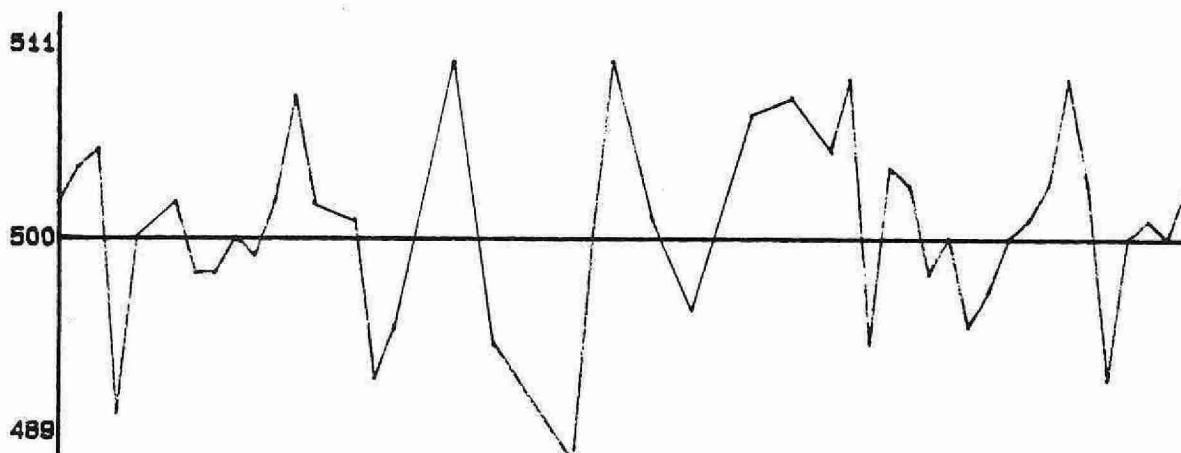
OTHER CHECKS:	Number of Data	Data Mean	Standard(1) Deviation
Blank	54	-0.30	5.026

QUALITY CONTROL GRAPHS SOLIDS - DISSOLVED - RSF (MG/L)

FROM: 02/01/88
TO: 24/11/88

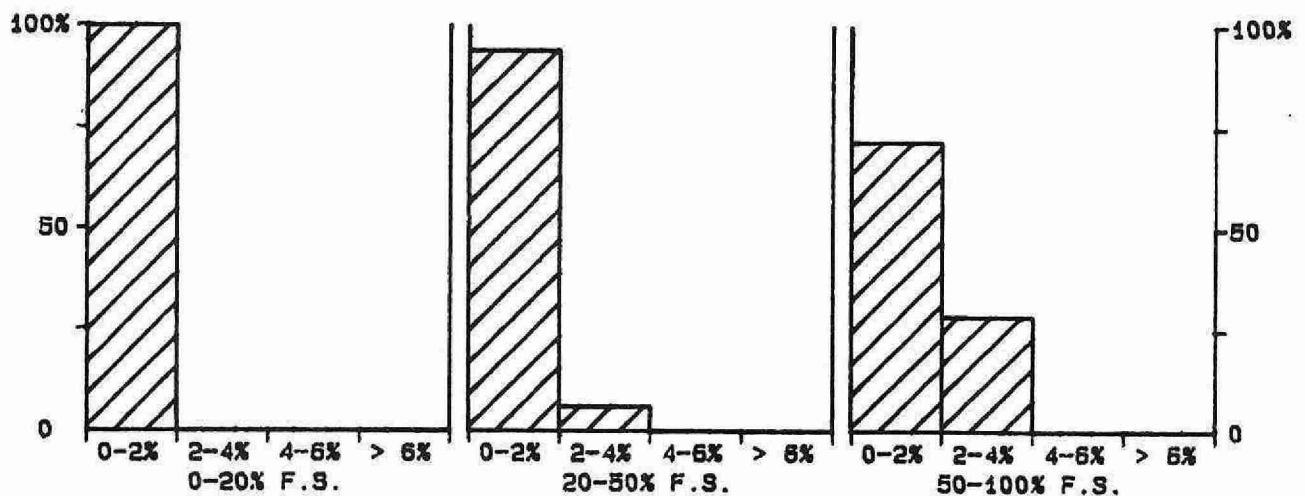


RECOVERY SAMPLE R1



RECOVERY SAMPLE R2

— EXPECTED VALUE



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 3000 MG/L

***** SOLIDS - IGNITED *****

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced	: Before '81
LIS Test Name Code	: RSFA,RSPA,RSTA	Units	: mg/L or mg/Kg
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 107AB4,207AB5,507AB4	Supervisor	: P. Campbell
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Leachates		

SAMPLING:

Quantity Required : 75-500 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

The procedure for dissolved, particulate, or total solids is followed and the dried residue is ignited at 600°C for one hour in a muffle furnace. As soon as practical, the dish is transferred to a desiccator to cool. The ignited or ash weight is obtained as the difference between the final ignited weight and the original dish weight. Similarly the volume used in the ignited calculations is the volume selected for the original dried solids measurement. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

- Balance (4/5-decimal places), muffle furnace, ceramic dishes, Petri dishes
- Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Current W value: 2,0.5,2 T value: 10,2.5,10

CONTROLS:

Calibration : 4 S class weights, e.g. QCA
Drift : Balance zero is checked at least every 20 dishes.

MODIFICATIONS:

01/05/82 -Microcomputer control was introduced

NOTES:

- In the order listed above, W and T values refer to the residual ash after ignition of the dried residual from dissolved, particulate, and total solids determinations.
- Duplicate data refer to ash residuals rather than loss on ignition.
- Detection criteria estimates are unreliable due to limited data; samples requiring these tests are usually sewage sludges with high solids contents.
- As the same two balances are used for all solids analyses in the Sewage/Industrial laboratory, the calibration control data are only listed once in the Solids-Total report for Ignited Dissolved and Ignited Total test.

SOLIDS-DISSOLVED IGNITED - RSFA
QUALITY CONTROL DATA FROM 02/01/88 TO 29/07/88

Lab: Solids and BOD

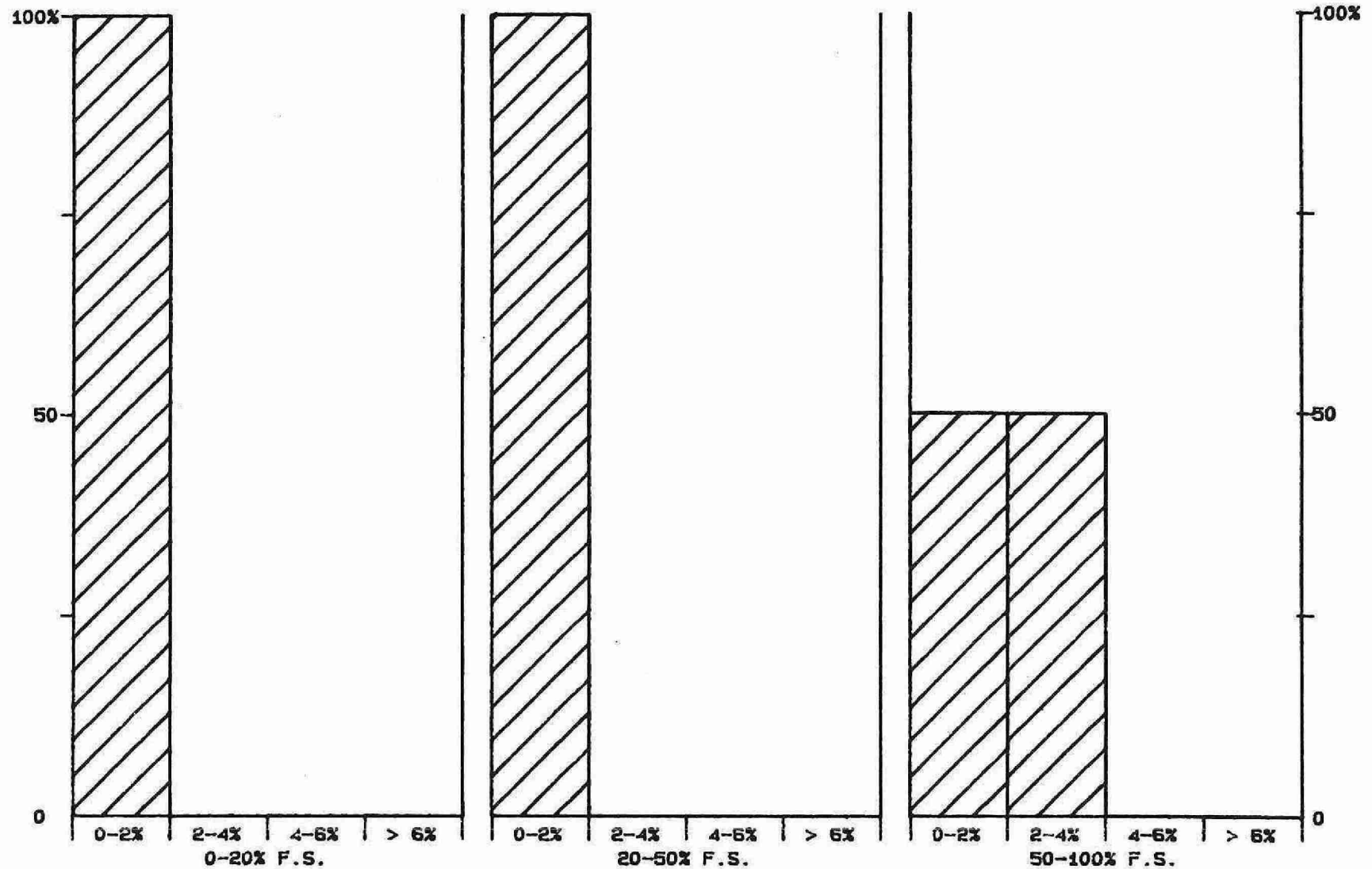
Analytical Range: - to 3000 mg/L

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	-----	-----	-----	-----
	3	0.0 - 200.0	4.38	3.4
	3	200 - 400	6.9	2.7
	2	400 - 600	7.2	1.6
	1	600 - 1000	N/A	N/A
	1	1000 - 3000	N/A	N/A
	10	Overall	10.1	N/A

OTHER CHECKS:	Number of Data	Data Mean	Standard(1) Deviation
	-----	-----	-----
Blank	11	-2.15	6.035

QUALITY CONTROL GRAPH
SOLIDS-DISSOLVED IGNITED - RSFA (MG/L)

FROM: 02/01/88
TO: 29/07/88



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 3000 MG/L

SOLIDS-PARTICULATE IGNITED - RSPA
QUALITY CONTROL DATA FROM 06/01/88 TO 20/12/88

Lab: Solids and BOD

Analytical Range: - to 3000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	72	0.50002	0.49993	-0.00004	0.000018
b :	72	0.05002	0.04999	-0.00003	0.000018
a+b :	72	0.55004	0.54997	-0.00007	0.000029
a-b :	72	0.45000	0.44999	-0.00001	0.000020

s.d.(AB): Sw(within run):0.000014 S(between runs):0.000018 S/Sw: 1.27

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.5499 to 0.5501 for A+B
0.4499 to 0.4500 for A-B

DUPLICATES:

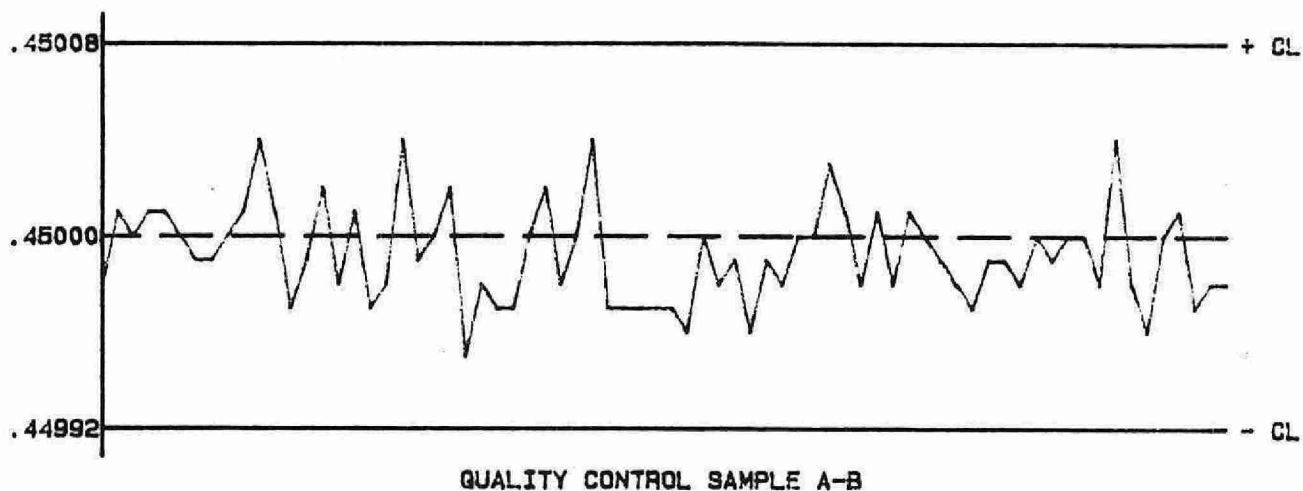
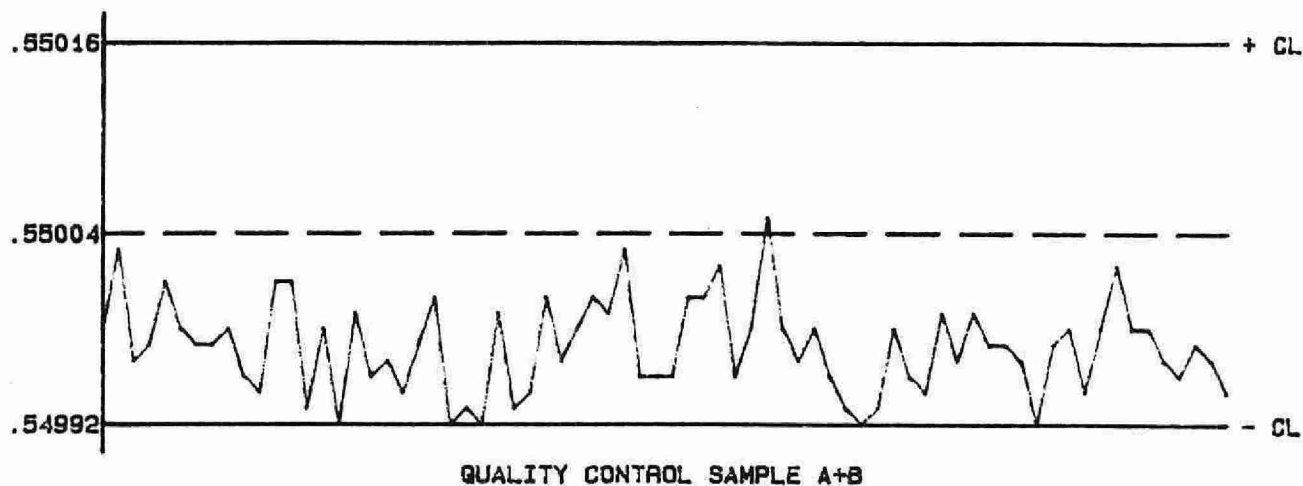
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
14	0.0 - 100.0	3.32	8.6
6	100 - 500	7.3	2.2
7	500 - 1000	15.8	2.1
5	1000 - 1500	19.0	1.4
6	1500 - 3000	49.1	2.3
38	Overall	22.0	N/A

OTHER CHECKS:

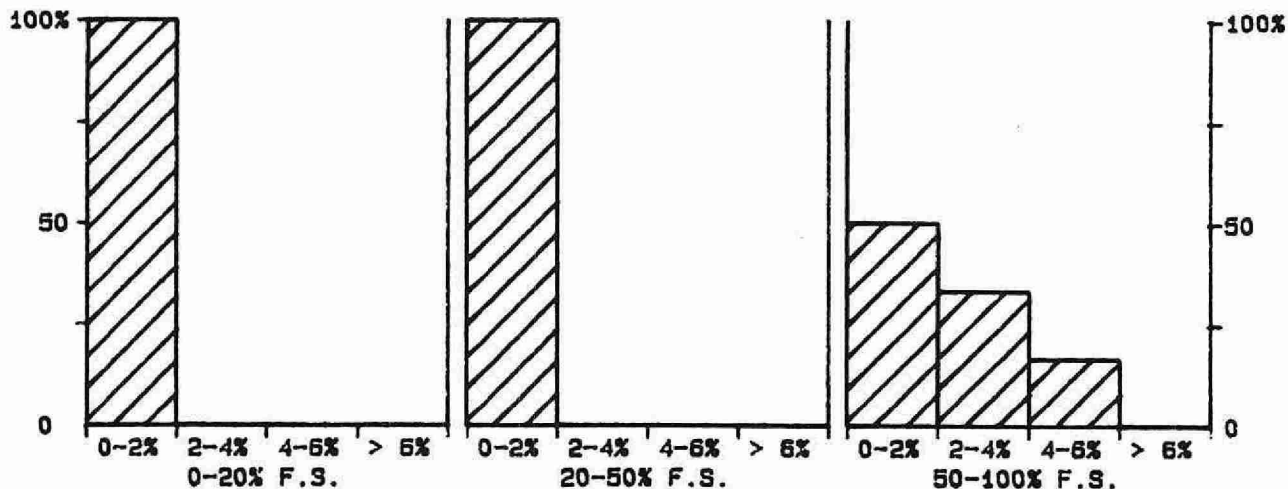
	Number of Data	Data Mean	Standard(1) Deviation
Blank :	46	-0.23	0.365

QUALITY CONTROL GRAPHS SOLIDS-PARTICULATE IGNITED - RSPA (MG/L)

FROM: 06/01/88
TO: 20/12/88



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)



-329-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 3000 MG/L

SOLIDS - TOTAL IGNITED - RSTA
QUALITY CONTROL DATA FROM 06/01/88 TO 21/12/88

Lab: Solids and BOD

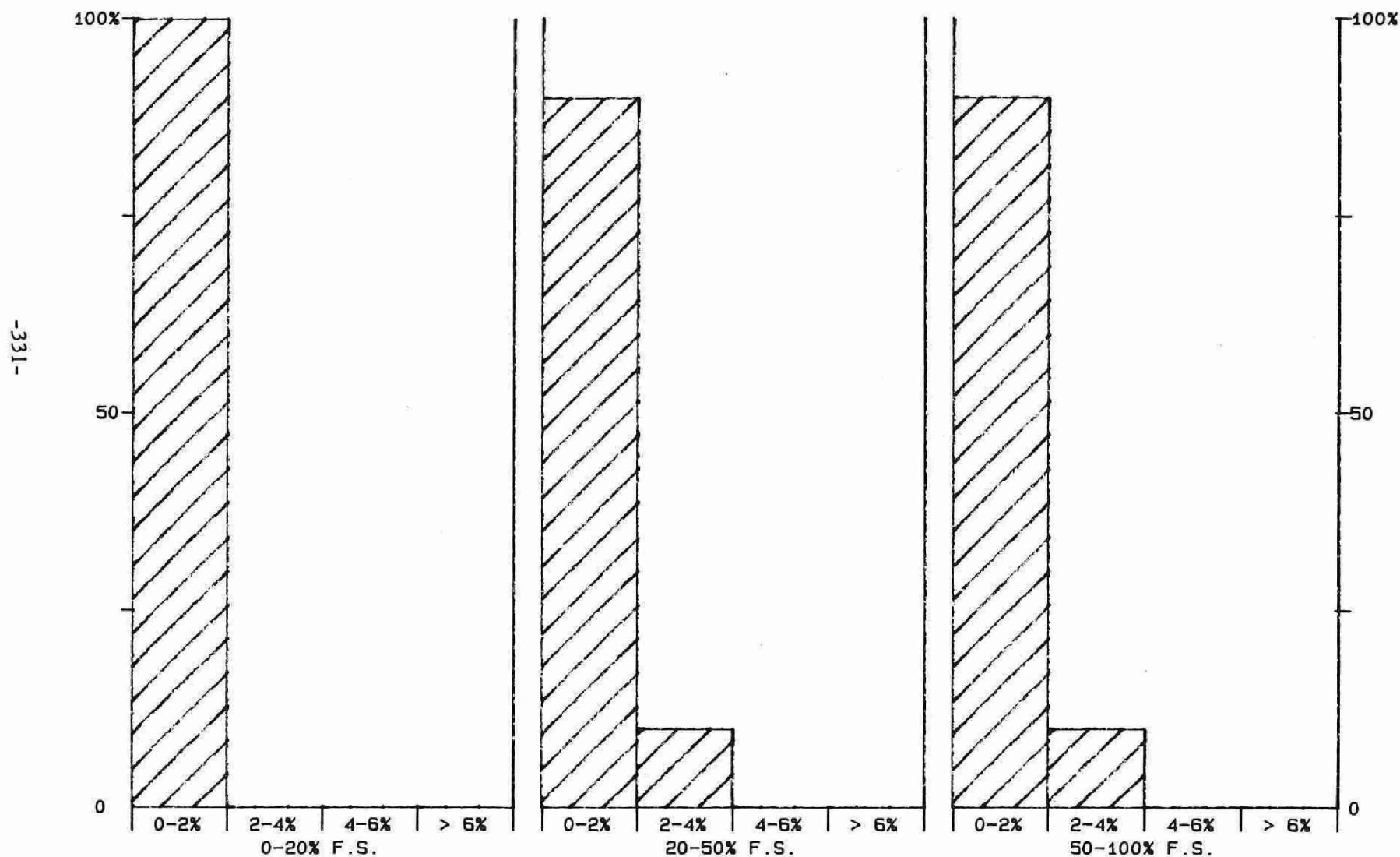
Analytical Range: - to 30000 mg/L

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	-----	-----	-----	-----
	24	0 - 4000	42.9	1.7
	4	4000 - 8000	42.3	0.8
	4	8000 - 12000	264.7	2.5
	5	12000 - 18000	105.4	0.8
	8	18000 - 30000	318.1	1.4
	45	Overall	163.1	N/A

OTHER CHECKS:	Number of Data	Data Mean	Standard(1) Deviation
	-----	-----	-----
Blank	43	-0.94	5.185

QUALITY CONTROL GRAPH
SOLIDS - TOTAL IGNITED - RSTA (MG/L)

FROM: 06/01/88
TO: 21/12/88



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 30000 MG/L

***** SOLIDS - PARTICULATE *****

IDENTIFICATION:

Laboratory	:	Solids and BOD	Method Introduced	:	Before '81
LIS Test Name Code	:	RSP	Units	:	mg/L
Work Station Code	:	SOLIDS	Unit Code	:	064000
Method Code	:	206AB5	Supervisor	:	P. Campbell
Sample Type/Matrix	:	Sewage, Industrial Waste, Drinking Waters, Leachates, Effluents and Surface Waters			

SAMPLING:

Quantity Required : 5-500 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

An appropriate shaken sample volume (5 to 500 mL) is pipetted or quickly poured into a graduated cylinder, and the volume is measured. The aliquot is then filtered under moderate suction through a preweighed Whatman 934AH glass fibre filter. The cylinder and then the filter are washed with 30 mL distilled water. The filter is dried at 103-105°C, and suspended solids content is calculated by difference. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

- Balance (4/5-decimal places), drying oven, suction filtration apparatus
- Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

Balance zero

CONTROLS:

Calibration	:	2 S class weights, e.g. QCA for each balance (results in grams)
Recovery	:	LTBL plus 2 standards, e.g. R1
Drift	:	Balance zero is checked 4 times daily
Blank	:	Filter washed with 50 mL distilled water; corrected using blank correction factor outlined below (expected result: 0.00 mg/L).

MODIFICATIONS:

01/07/81 -Current microcomputer control system was introduced.
01/03/83 -QC program was expanded to include recovery standards.
01/05/83 -Prerinsing of filters was discontinued. Instead, 5 filters from each box of 100 were weighed before and after rinsing to correct results for filters used with samples.
01/07/83 -New glass and acrylic filter holders (Whatman 90 mm) replaced Buchner funnels.
26/03/86 -47 mm diameter magnetic filtration units used for all analyses. Aliquots used for mixed liquor and aeration samples were sometimes as low as 5 mL (i.e. factor 200) but precision should be improved at low end of analytical range.
01/12/86 -Same as for Solids - Dissolved.
01/08/87 -A standard correction factor was applied to all filters to account for weight loss during filtering (-0.0003g).

SOLIDS - PARTICULATE - RSP
QUALITY CONTROL DATA FROM 04/01/88 TO 23/12/88

Lab: Solids and BOD

Analytical Range: - to 3000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	276	0.50000	0.49998	-0.00002	0.000020
b :	276	0.05000	0.04999	-0.00001	0.000019
a+b :	276	0.55000	0.54996	-0.00004	0.000030
a-b :	276	0.45000	0.44999	-0.00001	0.000026

s.d.(AB): Sd(within run):0.000018 S(between runs):0.000020 S/Sw: 1.06

In any given day the calibration is accepted if the values obtained lie within the ranges:

0.5498 to 0.5501 for A+B

0.4498 to 0.4501 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	61	187	194	2.8
r2 :	61	47.2	46.5	1.27

DUPLICATES:

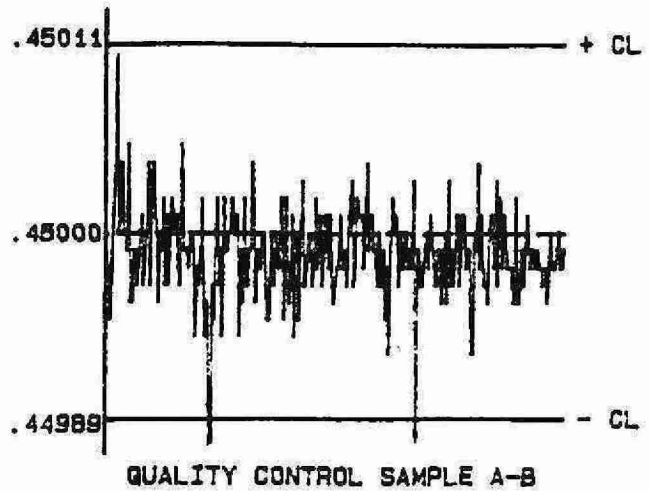
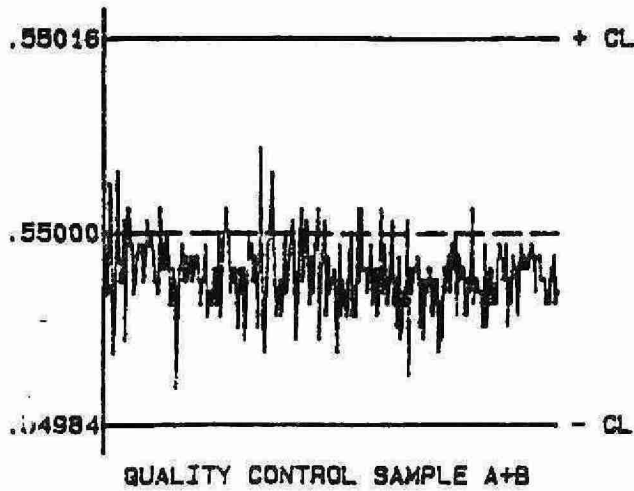
	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
29		0.0 - 25.0	0.72	8.6
33		25.0 - 50.0	2.56	6.8
90		50.0 - 150.0	5.09	5.2
111		150 - 3000	26.5	4.3
263		Overall	17.5	N/A

OTHER CHECKS:

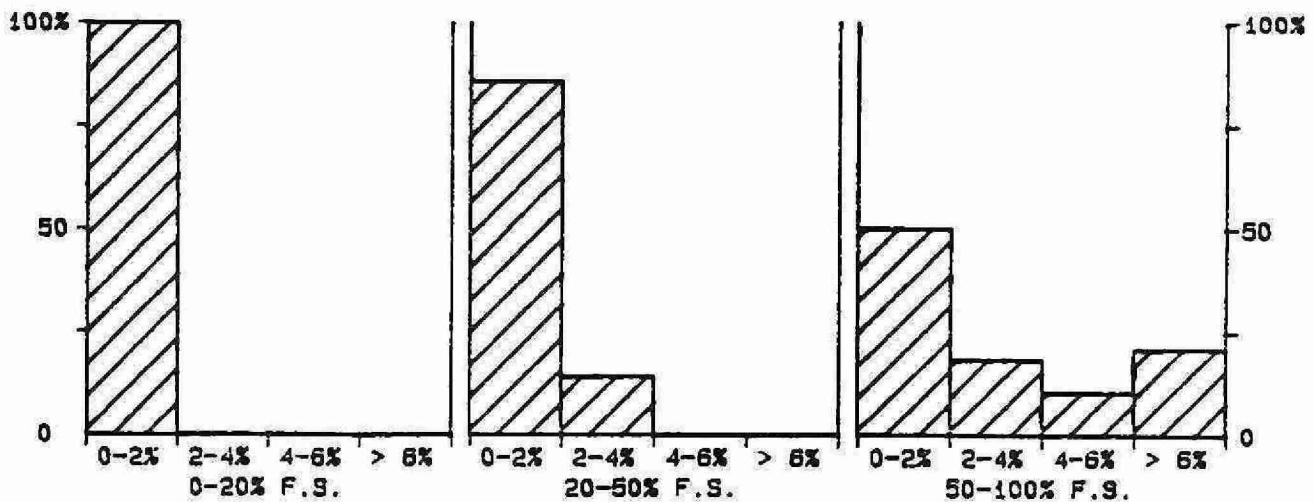
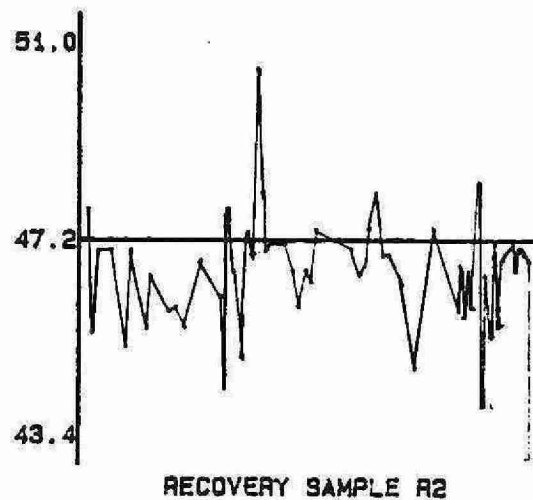
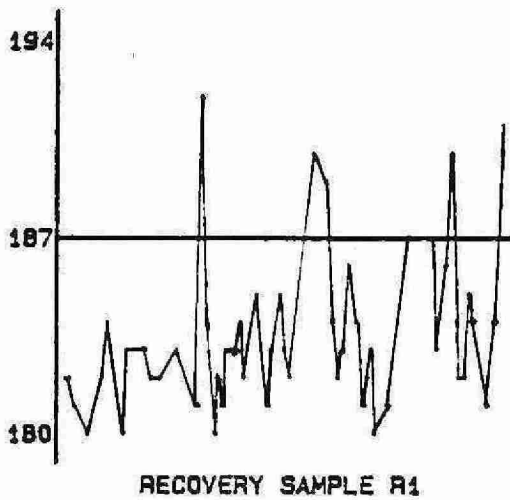
	Number of Data	Data Mean	Standard(1) Deviation
Blank :	199	0.31	0.250

QUALITY CONTROL GRAPHS SOLIDS - PARTICULATE - RSP (MG/L)

FROM: 04/01/88
TO: 23/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



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CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 3000 MG/L

***** SOLIDS - TOTAL *****

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced	: Before '81
LIS Test Name Code	: RST	Units	: mg/L or mg/kg
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 506AB4	Supervisor	: P. Campbell
Sample Type/Matrix	: Sewage, Industrial Waste, Drinking Waters, Leachates, Effluents, Sludge		

SAMPLING:

Quantity Required : 75-125 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

A 50.0 or 100 mL aliquot of sample is pipetted into a preweighed Teflon dish, dried at 103-105°C, and stored in a desiccator for at least 24 hours. After reweighing, the total residue or solids content is calculated by difference. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

-Balance (4/5-decimal places), drying oven, Teflon dishes
-Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

Balance zero and 1 built-in calibration weight

CONTROLS:

Calibration : 2 S class weights, e.g. QCA for each balance (results in grams)
Recovery : BL plus 2 standards, e.g. R1
Drift : Balance zero is checked at least 4 times daily

MODIFICATIONS:

15/01/82 -Microcomputer control was introduced.
01/07/85 -Teflon dishes replaced ceramic dishes and aliquot volume was increased to 100 mL where the expected result was below 1000 mg/L.
01/12/86 -Correction factor for dish tare weights, based on variation of a standard sealed vessel, was included in calculation.

NOTES:

Determination of detection is difficult because the test is rarely requested on low level samples.

SOLIDS - TOTAL - RST
QUALITY CONTROL DATA FROM 04/01/88 TO 21/12/88

Lab: Solids and BOD

Analytical Range: - to 60000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	180	50.0000	50.0003	0.0003	0.00012
b :	180	30.0000	30.0000	-0.0000	0.00009
a+b :	180	80.0000	80.0003	0.0003	0.00019
a-b :	180	20.0000	20.0003	0.0003	0.00010

s.d.(AB): Sw(within run): 0.00007 S(between runs): 0.00011 S/Sw: 1.50

On any given day the calibration is accepted if the values obtained lie within the ranges:

79.999 to 80.000 for A+B
 19.999 to 20.000 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	54	20000	20029	70.9
r2 :	54	2000	2005	17.4

DUPLICATES:

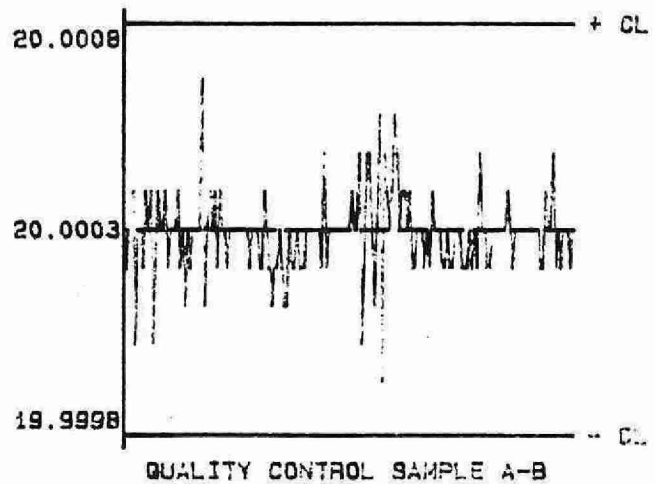
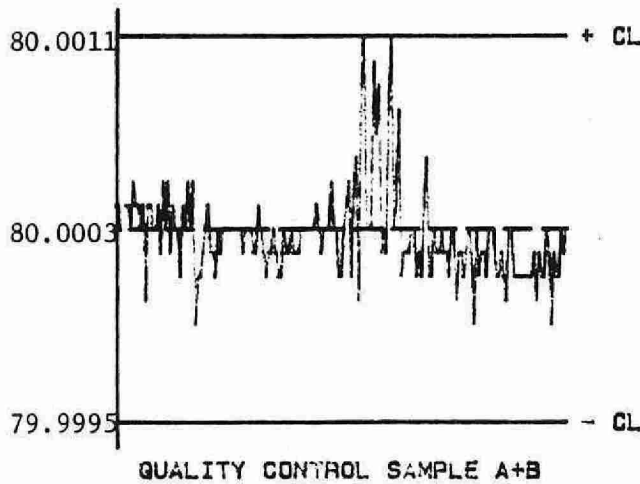
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
6	0 - 2000	17.1	3.0
3	2000 - 10000	80.4	0.9
8	10000 - 20000	88.6	0.6
34	20000 - 40000	170.9	0.6
15	40000 - 60000	444.1	0.9
66	Overall	247.3	N/A

OTHER CHECKS:

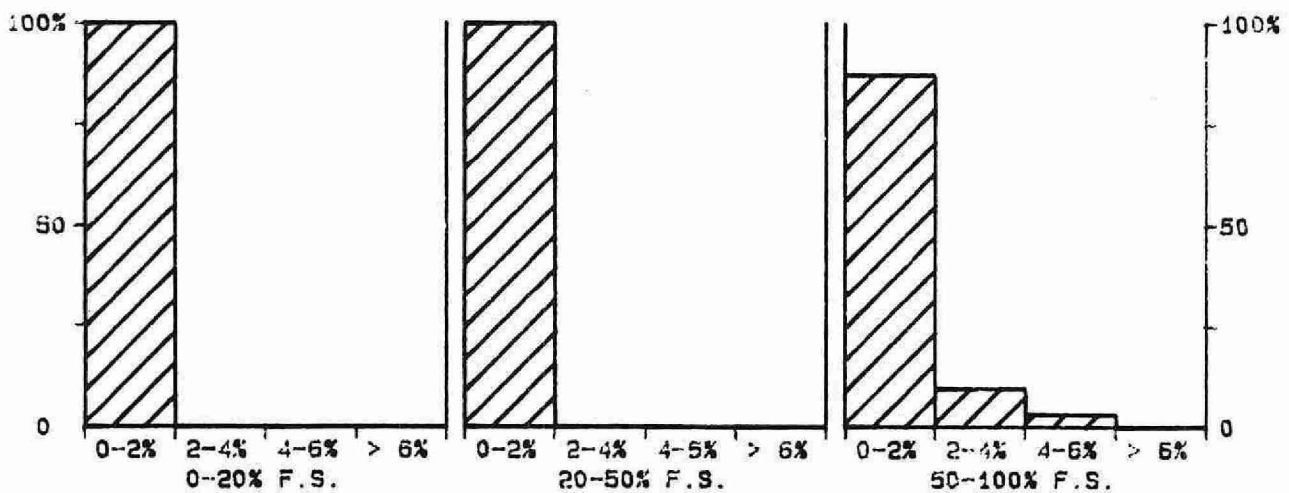
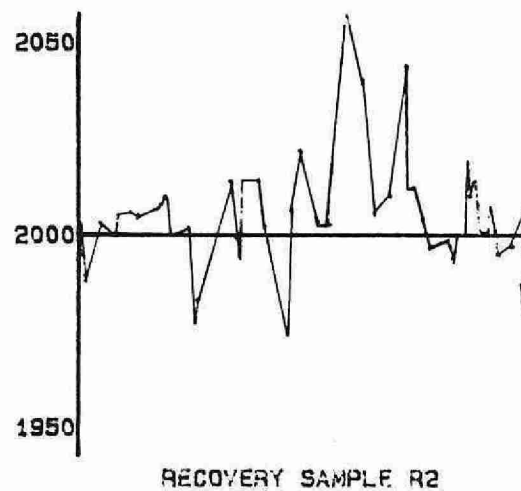
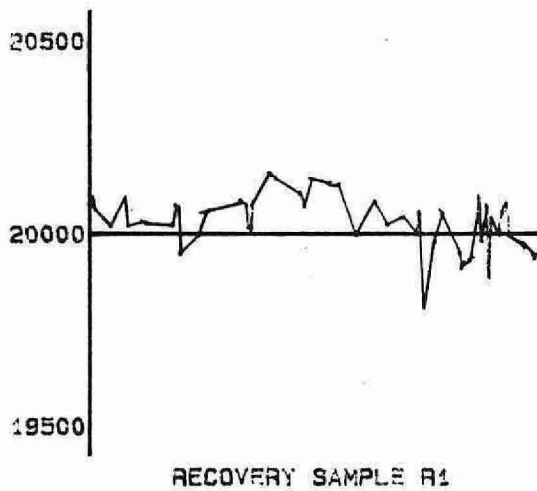
	Number of Data	Data Mean	Standard(1) Deviation
Blank :	65	-0.56	4.437

QUALITY CONTROL GRAPHS SOLIDS - TOTAL - RST (MG/L)

FROM: 04/01/88
TO: 21/12/88



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)



***** SULPHATE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: SSO4FR,SSO4NF	Units	: ug/Filter as SO ₄
Work Station Code	: PRSEQ	Unit Code	: 361941
Method Code	: 004AI0	Supervisor	: F. Lo
Sample Type/Matrix	: Teflon and nylon filters from sequential filter packs and nylon filters from LoVol filter packs.		

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL Polyethylene tube

SAMPLE PREPARTION:

Filters are extracted with 25.0 mL of DDW (Teflon) or 25.0 mL of 0.03 N NaOH (nylon) with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample scan to a series of standard scans. Results are converted to ug/filter as SO₄.
Full scale conductivity: 30 uS/cm.
N.B. Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; polyethylene tubes
Automated modular continuous flow ion chromatographic system

REPORTING:

Maximum Significant Figures: 3 Current W value: 1.0 T value: 5.0

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

MODIFICATIONS:

01/07/80 -Ion chromatographic procedure for precipitation samples was modified for analysis of Teflon and nylon filter extracts by developing the above filter extraction procedure.
10/03/84 -Microcomputer for automated sampling and timing was introduced. At that time automated spiking of samples with Na₂CO₃/NaHCO₃ was introduced.
10/05/85 -Microcomputer used for data reduction. Three additional calibration standards were set up.
April 1986 -Varian Spectrix, model 4270, introduced to convert calculation data to quadratic equation and calculate preliminary analyte concentration.
June 1988 -Direct Computer Input introduced. Uploading of instrument signal, calculation of analyte concentrations, and transmission of analytical results to LIS now done automatically.

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

SULPHATE - PRSEQ
QUALITY CONTROL DATA FROM 03/01/88 TO 22/12/88

Lab: Ion Chromatography

Analytical Range: - to 250.0 ug/Filter as SO4

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	80	200	201	1	1.8
b :	80	50	50	0	1.0
a+b :	80	250	252	2	2.0
a-b :	80	150	151	1	2.0

s.d.(AB): Sw(within run): 1.4 S(between runs): 1.5 S/Sw: 1.03

On any given day the calibration is accepted if the values obtained lie within the ranges:

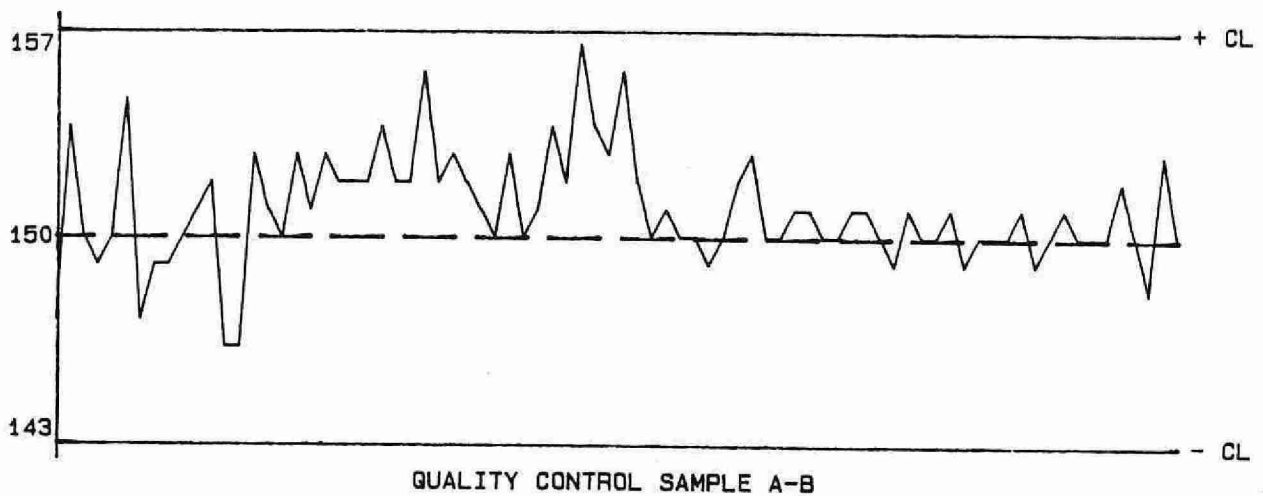
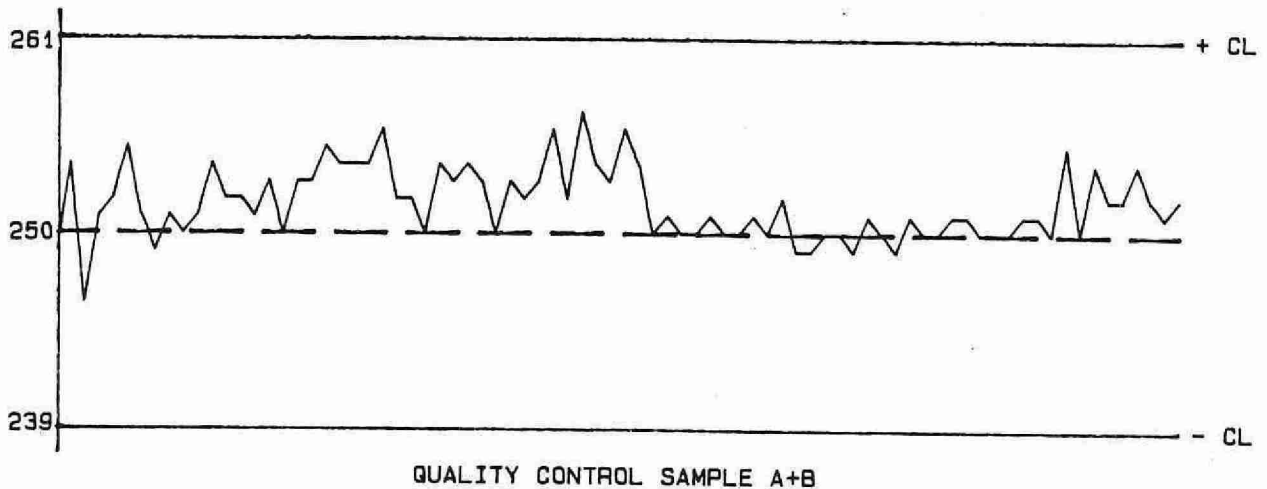
239 to 261 for A+B
 143 to 157 for A-B

DUPLICATES:

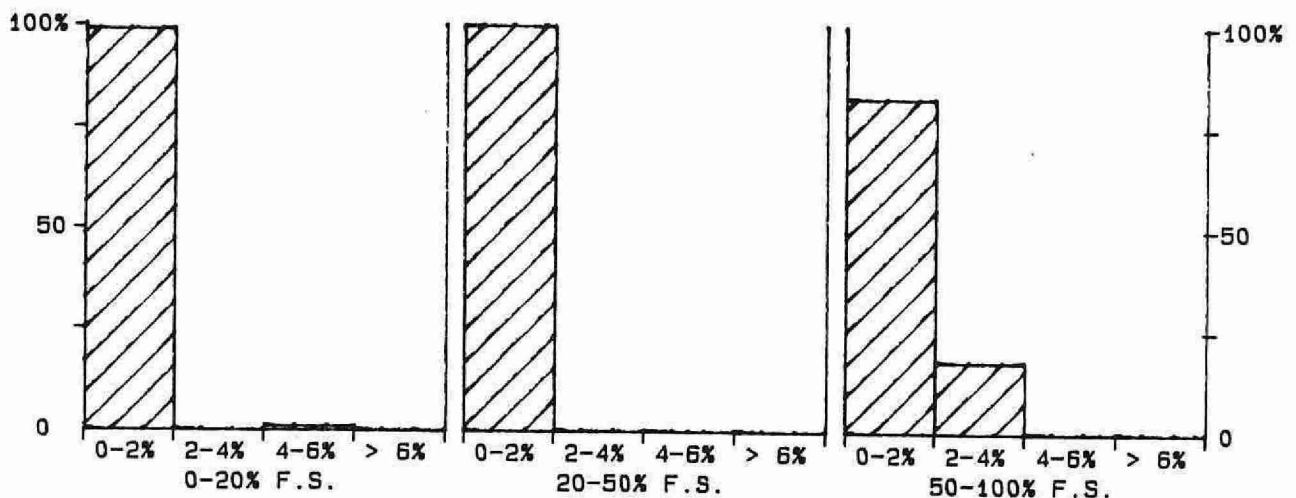
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
76	0.0 - 25.0	1.13	9.9
32	25.0 - 50.0	1.08	2.8
29	50.0 - 125.0	1.38	1.7
15	125.0 - 250.0	2.83	1.7
152	Overall	1.43	N/A

QUALITY CONTROL GRAPHS SULPHATE - PRSEQ (UG/FILTER AS S04)

FROM: 03/01/88
TO: 22/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 250 UG/FILTER AS S04
-341-

***** SULPHATE - PRECIPITATION *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: SSO4UR	Units	: mg/L as SO ₄
Work Station Code	: PRIC1	Unit Code	: 064941
Method Code	: 003AI0	Supervisor	: F. Lo
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 15 mL
Container : Plastic

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample scan to a series of standard scans. Full scale conductivity: 10 uS/cm.
N.B. Chloride and nitrogen-nitrate are determined simultaneously.

INSTRUMENTATION:

Basic modular continuous flow ion chromatographic system plus microcomputer for automated sample introduction, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

MODIFICATIONS:

01/04/86 -Varian Spectrex Model 4270 was introduced to convert calibration data to a quadratic equation and calculate preliminary sample concentrations; the latter, however, still have to be manually corrected for in-run sensitivity changes.
June 1988 -Direct Computer Input introduced. Uploading of instrument signal, calculation of analyte concentrations, and transmission of analytical results of LIS now done automatically.

SULPHATE-PRIC1
QUALITY CONTROL DATA FROM 05/01/88 TO 19/12/88

Lab: Ion Chromatography

Analytical Range: - to 10.00 mg/L as SO4

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	91	8.00	8.04	0.04	0.073
b :	91	2.00	2.00	-0.00	0.042
a+b :	91	10.00	10.04	0.04	0.088
a-b :	91	6.00	6.04	0.04	0.080

s.d.(AB): Sw(within run): 0.057 S(between runs): 0.060 S/Sw: 1.05

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.55 to 10.45 for A+B
5.70 to 6.30 for A-B

DUPLICATES:

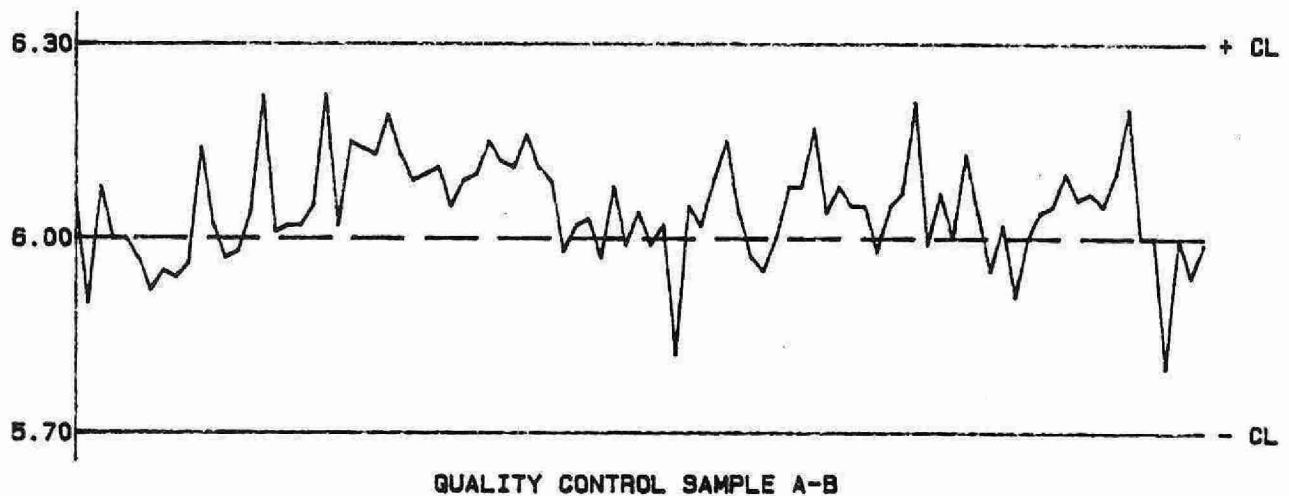
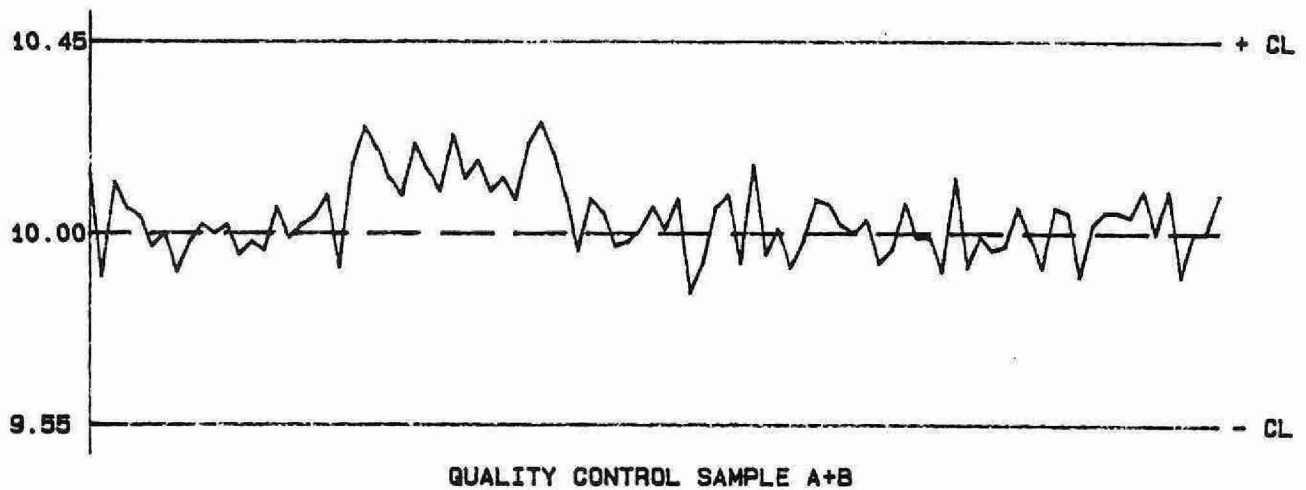
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
31	0.00 - 1.00	0.033	5.6
29	1.00 - 2.00	0.034	2.3
51	2.00 - 5.00	0.072	2.1
94	5.00 - 10.00	0.096	1.2
205	Overall	0.076	N/A

QUALITY CONTROL GRAPHS

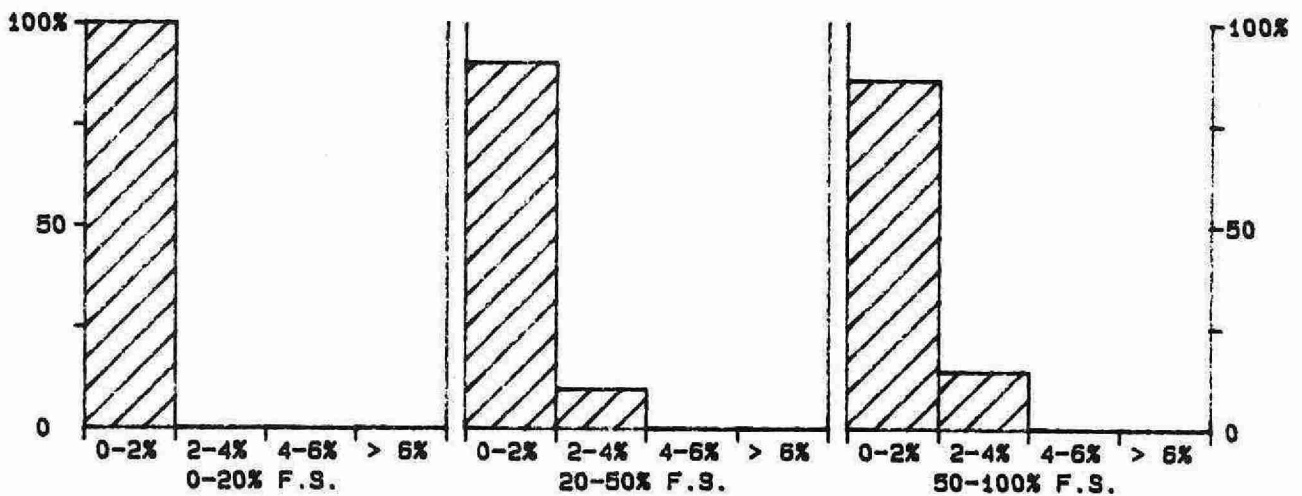
SULPHATE-PRIC1 (MG/L AS SO4)

FROM: 05/01/88

TO: 19/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10 MG/L AS SO4

***** SULPHATE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: SSO4UR	Units	: ug/Filter as SO ₄
Work Station Code	: PRLOV	Unit Code	: 361941
Method Code	: 004AIC	Supervisor	: F. Lo
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL Polyethylene Tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample scan to a series of standard scans. Results are converted to ug/filter as SO₄.

Full scale conductivity: 30 uS/cm.

N.B. Chloride and nitrogen-nitrate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; polyethylene tubes
Automated modular continuous flow ion chromatographic system

REPORTING:

Maximum Significant Figures: 3 Current W value: 1.0 T value: 5.0

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

MODIFICATIONS:

01/08/81 -Ion chromatographic procedure for precipitation samples was modified for analysis of LoVol W40 filter extracts by developing the above filter extraction procedure.

10/03/84 -Microcomputer for automated sampling and timing was introduced. At that time automated spiking of samples with Na₂CO₃/NaHCO₃ was introduced.

10/05/85 -Microcomputer used for data reduction. Three additional calibration standards were set up.

April 1986 -Varian Spectrix, model 4270, introduced to convert calculation data to quadratic equation, and calculate preliminary analyte concentration.

June 1988 -Direct Computer Input introduced. Uploading of instrument signal, calculation of analyte concentrations, and transmission of analytical results of LIS now done automatically.

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

No data summary available for period not covered in performance report.

SULPHATE - PRLOV
QUALITY CONTROL DATA FROM 06/01/88 TO 12/10/88

Lab: Ion Chromatography

Analytical Range: - to 500 ug/Filter as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	34	400	403	3	3.5
b :	34	100	100	0	1.8
a+b :	34	500	503	3	3.7
a-b :	34	300	302	2	4.1

s.d.(AB): Sw(within run): 2.9 S(between runs): 2.8 S/Sw: 0.96

On any given day the calibration is accepted if the values obtained lie within the ranges:

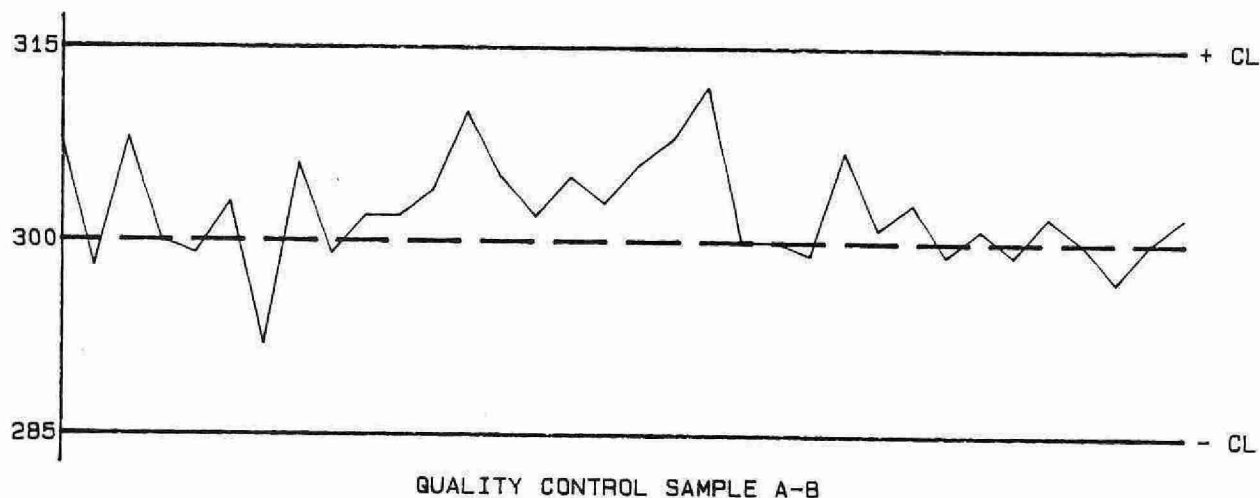
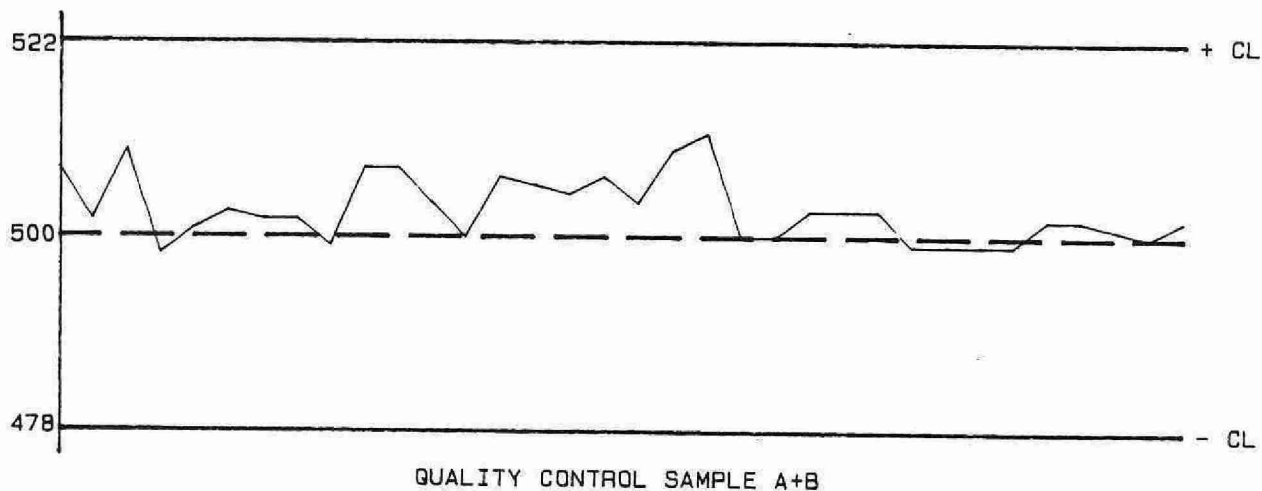
478 to 522 for A+B
 285 to 315 for A-B

DUPLICATES:

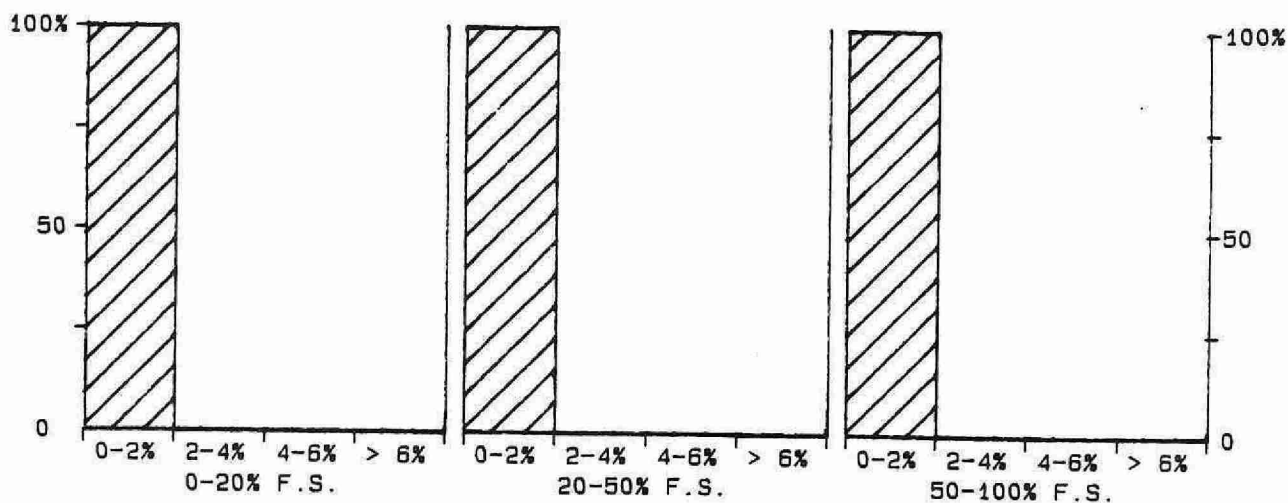
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
7	0 - 50	0.4	1.1
9	50 - 100	2.7	3.4
16	100 - 250	3.3	2.1
5	250 - 500	3.7	1.3
37	Overall	2.9	N/A

QUALITY CONTROL GRAPHS SULPHATE - PALOV (UG/FILTER AS SO4)

FROM: 06/01/88
TO: 12/10/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 500 UG/FILTER AS SO4

***** SULPHATE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/82
LIS Test Name Code	: SS04UR	Units	: mg/L as SO ₄
Work Station Code	: RMDSO4	Unit Code	: 064941
Method Code	: 003AI0	Supervisor	: F. Lo
Sample Type/Matrix	: Rivers, Lakes, Domestic Waters, Leachates, Soil Extracts, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic bottle

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the samples by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. The concentration of sulphate in mg/L as SO₄ is determined by comparison of the sample scan to a series of standard scans.
Full scale conductivity: 100 uS/cm.

INSTRUMENTATION:

Basic modular continuous flow ion chromatographic system plus control module (in-house design) for automated sample introduction and timing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 13 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : 2 standards

MODIFICATIONS:

01/01/84 -Packed suppressor column was replaced by a fibre suppressor (walls of fibre are ion-exchange media). Full scale for high analytical was increased from 50.0 to 100 mg/L as SO₄; QC standards were adjusted accordingly. Analytical rate was doubled.
17/10/85 -Increase number of standards to 16 to ensure proper calibration at low end of analytical range.
24/04/86 -APIOS Dorset samples assigned to second system with full scale 20 mg/L as SO₄.
29/04/86 -Full scale increased from 100 to 200 mg/L as SO₄; QC standards were adjusted accordingly.
19/03/87 -Adopted single range of 100 mg/L for sulphate analysis. Q.C. solutions adjusted to: QCA 80 mg/L as SO₄ and QCB 20 mg/L as SO₄.
30/06/88 -Direct Computer Input introduced. Uploading of chromatographic signal, calibration, calculation of analytical results to LIS now done automatically.

SULPHATE-RMDS04
QUALITY CONTROL DATA FROM 05/01/88 TO 21/12/88

Lab: Ion Chromatography

Analytical Range: - to 100.0 mg/L as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	95	80.0	80.2	0.2	0.76
b :	95	20.0	19.8	-0.2	0.34
a+b :	95	100.0	100.1	0.1	0.96
a-b :	95	60.0	60.4	0.4	0.70

s.d.(AB): Sw(within run): 0.49 S(between runs): 0.59 S/Sw: 1.19

On any given day the calibration is accepted if the values obtained lie within the ranges:

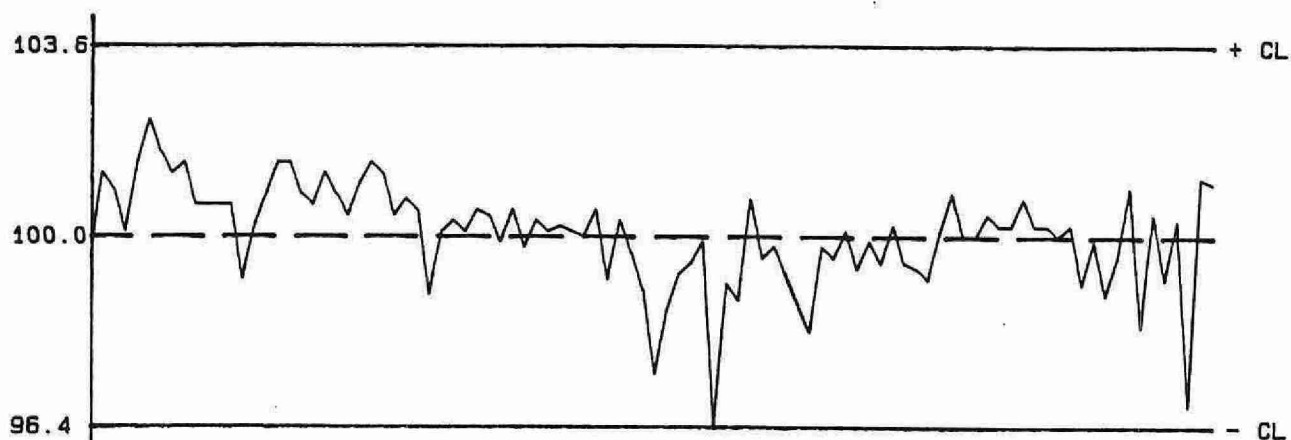
96.4 to 103.6 for A+B
 57.6 to 62.4 for A-B

DUPLICATES:

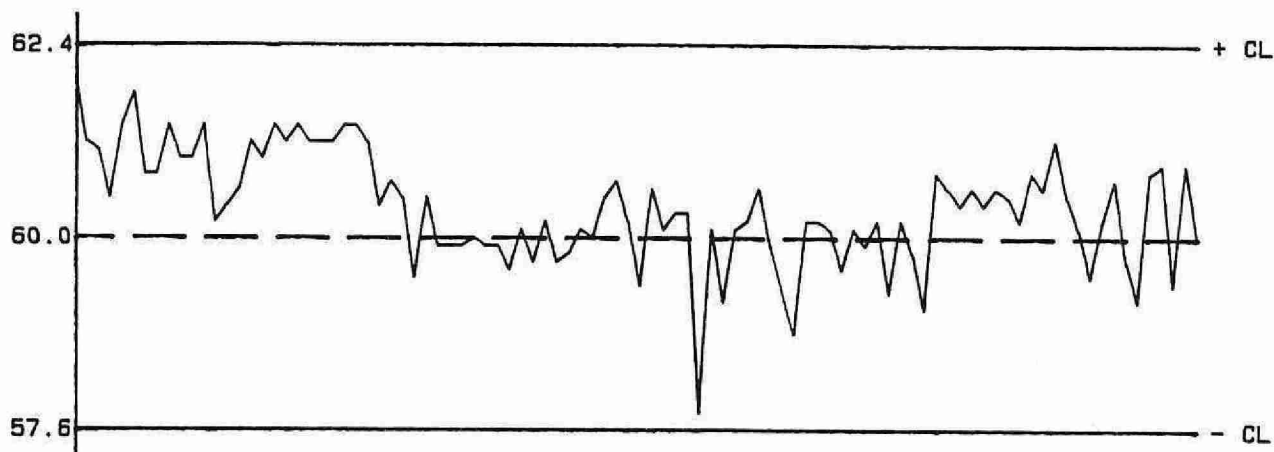
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
110	0.0 - 20.0	0.29	2.8
90	20.0 - 50.0	0.84	2.7
32	50.0 - 100.0	1.94	2.8
232	Overall	0.91	N/A

QUALITY CONTROL GRAPHS SULPHATE-RMDSO4 (MG/L AS SO4)

FROM: 05/01/88
TO: 21/12/88

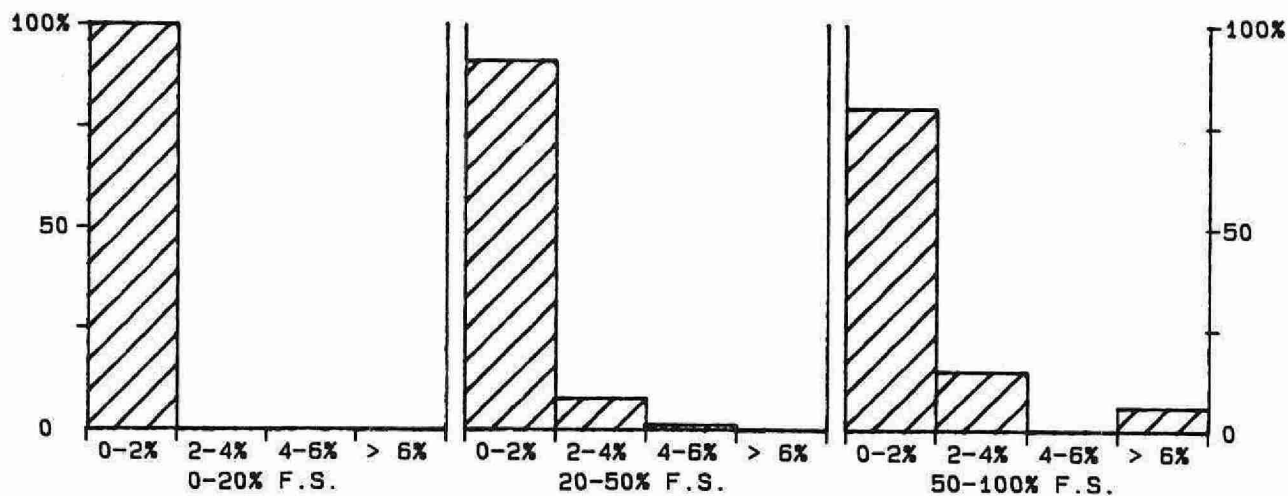


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-351-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 MG/L AS SO4

**** SULPHATE - SOIL (Xw) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: SSO4EW	Units	: ug/g as SO ₄
Work Station Code	: DOANIONX	Unit Code	: 073941
Method Code	: 301AI5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 10 g air dried
Container : Glass jars

SAMPLE PREPARATION:

Samples are air dried,disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

Five grams of sample is agitated for 60 minutes with 25 mL deionized water. Samples are centrifuged and the supernatant is filtered through a 0.45 um membrane filter. Sulphate is determined on the filtrate by ion chromatography.

INSTRUMENTATION:

- Waters Model 430 Conductivity Detector
- Spectroflow 400 solvent delivery system
- Spectro-Physics SP780 XR autosampler
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : 2 method BL plus 2 standards, e.g. QCA
Recovery : 2 long term soil samples representing different soil types
Drift : 100% full scale standard every 10 samples

MODIFICATIONS:

01/10/86 -Replacement of Wescan Ion Analyzer with equipment listed above (Wescan columns used on both systems).
01/06/86 -Agitation of samples increased from 30 minutes to 1 hour.

SULPHATE - WATER EXTRACTABLE
QUALITY CONTROL DATA FROM 02/01/88 TO 14/06/88

Lab: Dorset Soils

Analytical Range: - to 100.0 ug/g as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	9	36.0	36.1	0.1	0.51
b :	9	76.0	76.2	0.2	0.94
a+b :	9	112.0	112.2	0.2	1.19
a-b :	9	-40.0	-40.1	-0.1	0.95

s.d.(AB): Sw(within run): 0.67 S(between runs): 0.76 S/Sw: 1.13

On any given day the calibration is accepted if the values obtained lie within the ranges:

104.5 to 119.5 for A+B
-45.0 to -35.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	8	55.0	53.7	2.51
r2 :	8	19.0	18.4	0.79

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
12	0.0 - 20.0	0.96	8.0
16	20.0 - 50.0	1.27	4.2
2	50.0 - 100.0	1.50	2.6
30	Overall	1.18	N/A

OTHER CHECKS:

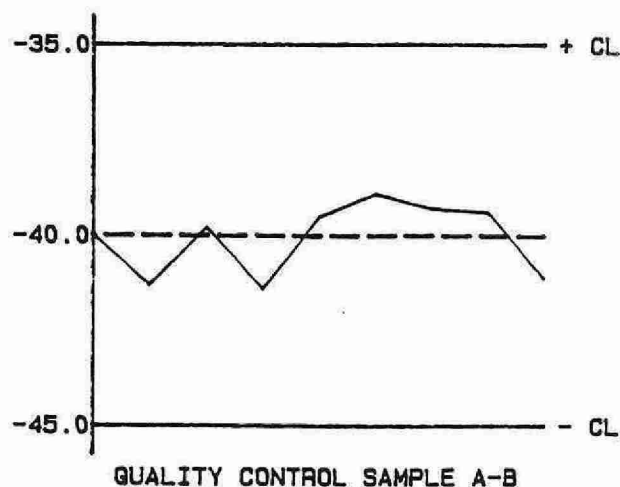
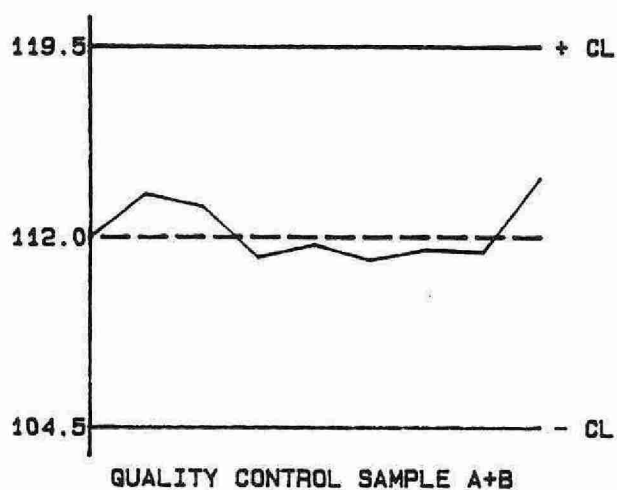
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	0	N/A	N/A

QUALITY CONTROL GRAPHS

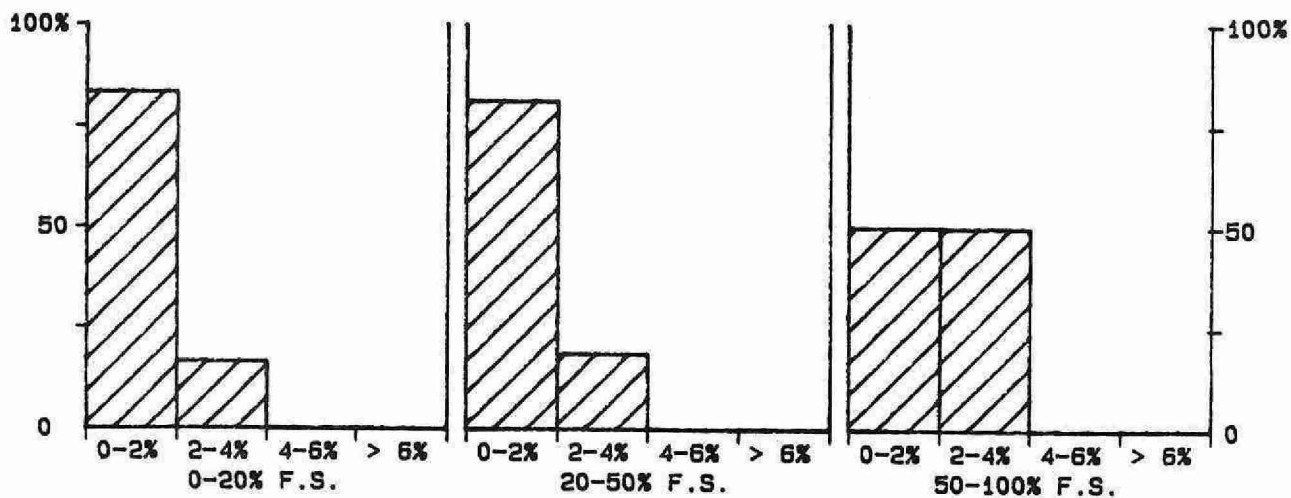
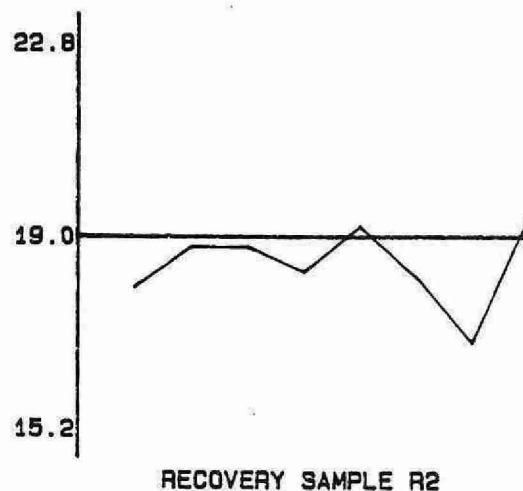
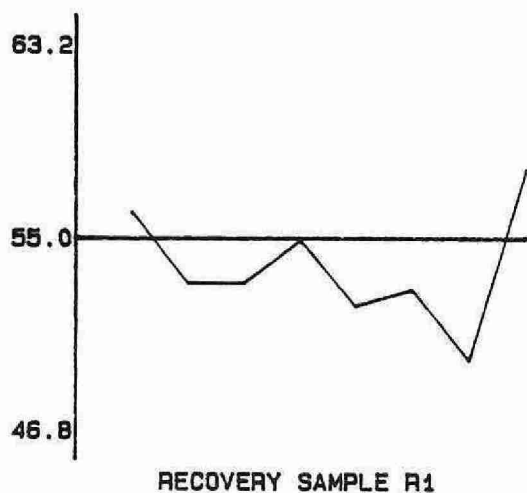
SULPHATE - WATER EXTRACTABLE (UG/G)

FROM: 02/01/88

TO: 14/06/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



SULPHATE - WATER EXTRACTABLE
QUALITY CONTROL DATA FROM 15/06/88 TO 01/09/88

Lab: Dorset Soils

Analytical Range: - to 100.0 ug/g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	9	36.0	36.6	0.6	0.77
b :	9	76.0	76.5	0.5	0.70
a+b :	9	112.0	113.1	1.1	1.02
a-b :	9	-40.0	-39.9	0.1	1.07

s.d.(AB): Sw(within run): 0.76 S(between runs): 0.74 S/Sw: 0.97

On any given day the calibration is accepted if the values obtained lie within the ranges:

104.5 to 119.5 for A+B
-45.0 to -35.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	9	55.0	56.0	2.46
r2 :	9	24.0	23.8	1.18

DUPLICATES:

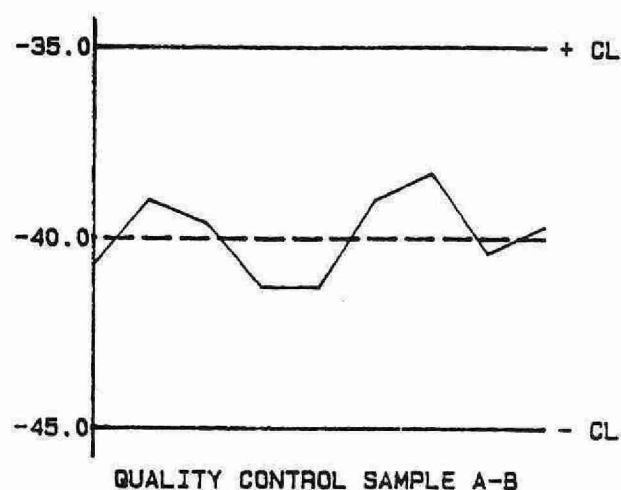
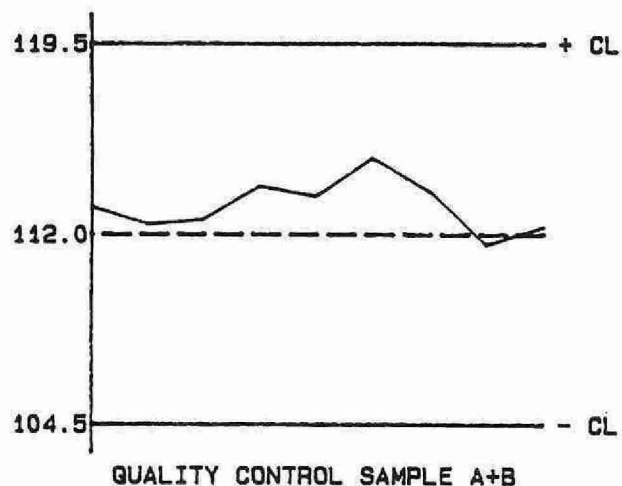
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
16	0.0 - 20.0	0.63	7.9
4	20.0 - 50.0	1.73	6.0
2	50.0 - 100.0	0.47	0.5
22	Overall	0.92	N/A

OTHER CHECKS:

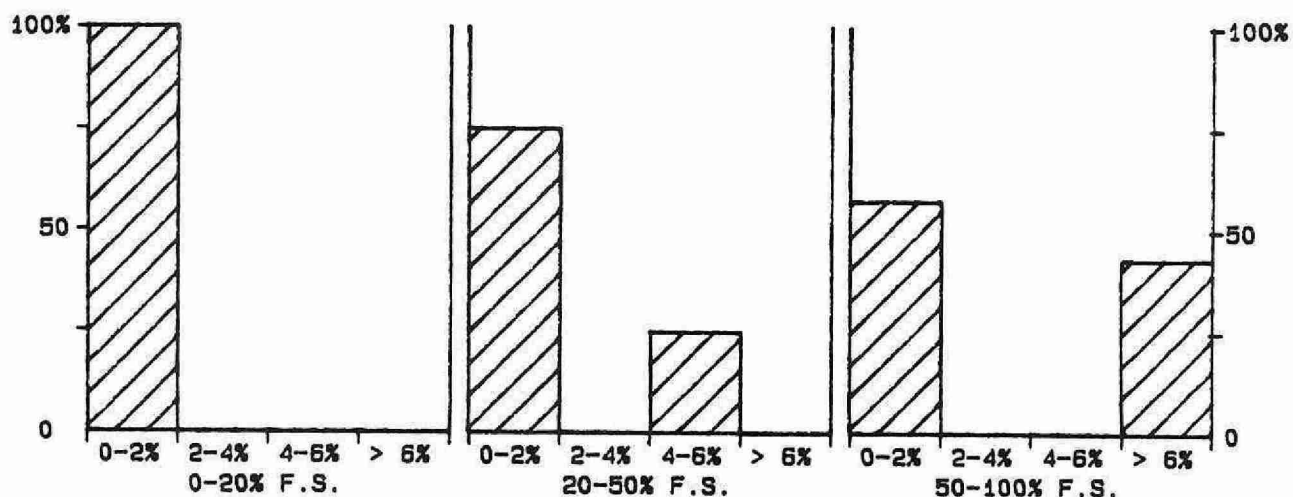
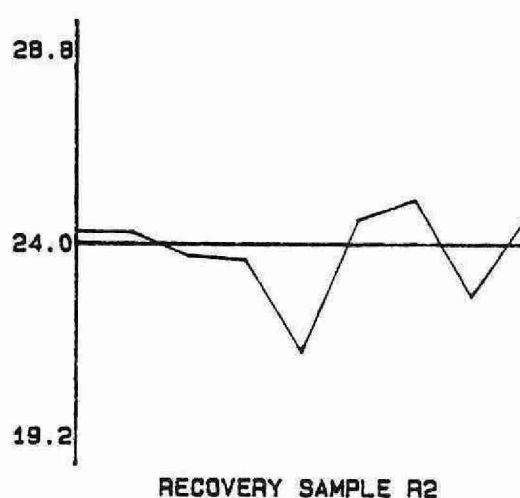
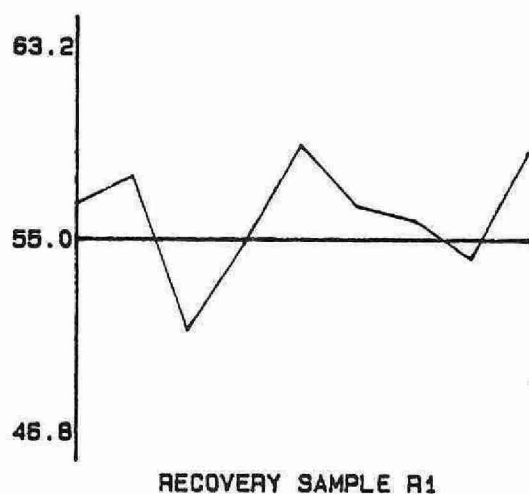
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	0	N/A	N/A

QUALITY CONTROL GRAPHS SULPHATE - WATER EXTRACTABLE (UG/G)

FROM: 15/06/88
TO: 01/09/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



***** SULPHUR DIOXIDE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: SSO2FR	Units	: ug/Filter as SO ₂
Work Station Code	: PRSEQ	Unit Code	: 361943
Method Code	: 004AI0	Supervisor	: F. Lo
Sample Type/Matrix	: Teflon and nylon filters from sequential filter packs and nylon filters from LoVol filter packs.		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL Polyethylene tube
Other	: Filter is impregnated with potassium carbonate/glycerol solution.

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of 0.05% H₂O₂ in polyethylene tubes with one hour of mechanical shaking, followed by ultrasonic treatment to enhance extraction, then a 24 hour rest period. SO₂ is converted to SO₄ in the process.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the extract by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample scan to a series of standard scans. Results are converted to ug/filter as SO₂. Full scale conductivity: 30 uS/cm.

INSTRUMENTATION:

Mechanical shaker; ultrasonic bath; polyethylene tubes
Automated modular continuous flow ion chromatographic system

REPORTING:

Maximum Significant Figures: 3	Current W value: 1.0	T value: 5.0
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

MODIFICATIONS:

01/07/80 -Ion chromatographic procedure for precipitation samples was modified for analysis of W41 filter extracts by developing the extraction procedure.
10/03/84 -Microcomputer for automated sampling and timing was introduced. At that time automated spiking of samples with Na₂CO₃/NaHCO₃ was introduced.
15/03/84 -Streamlined procedure for extraction of W41 filters in one 50 mL polyethylene tube was adopted, eliminating two container transfers, and changing the extraction volume to 50.0 mL from 100.0 mL. Full scale reduced from 700 to 350 ug/filter as SO₂.

20/09/84 -Chloride range changed from 1.50 mg/L to 2.00 mg/L full scale.

12/04/85 -Q.C. standards for chloride changed: 1.20 to 1.60 mg/L for Q.C.A, and 0.3. to 0.40 mg/L for Q.C.B.

10/05/85 -Microcomputer used for data reduction. Three additional calibration standards were included.

April 1986 -Varian Spectrix, model 4270, introduced to convert calculation data to quadratic equation and calculate preliminary analyte concentration.

June 1988 -Direct Computer Input introduced. Uploading of instrument signal, calculation of analyte concentrations, and transmission of analytical results to LIS now done automatically.

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

SULPHUR DIOXIDE - PRSEQ
QUALITY CONTROL DATA FROM 03/01/88 TO 22/12/88

Lab: Ion Chromatography

Analytical Range: - to 350 ug/Filter as SO₂

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	40	268	268	0	2.5
b :	40	66	67	1	1.4
a+b :	40	334	335	1	3.1
a-b :	40	202	201	-1	2.7

s.d.(AB): Sw(within run): 1.9 S(between runs): 2.0 S/Sw: 1.06

On any given day the calibration is accepted if the values obtained lie within the ranges:

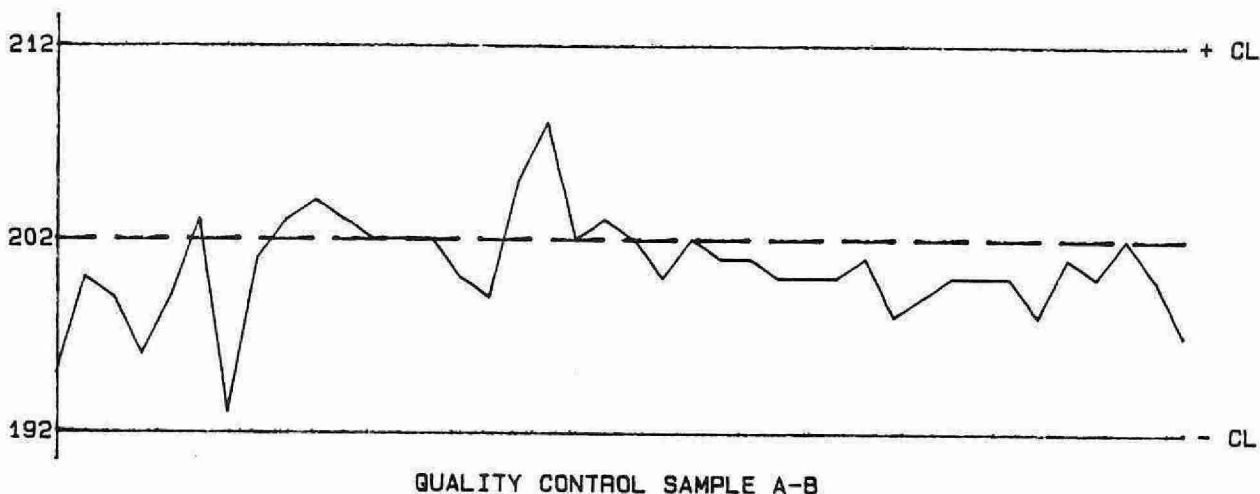
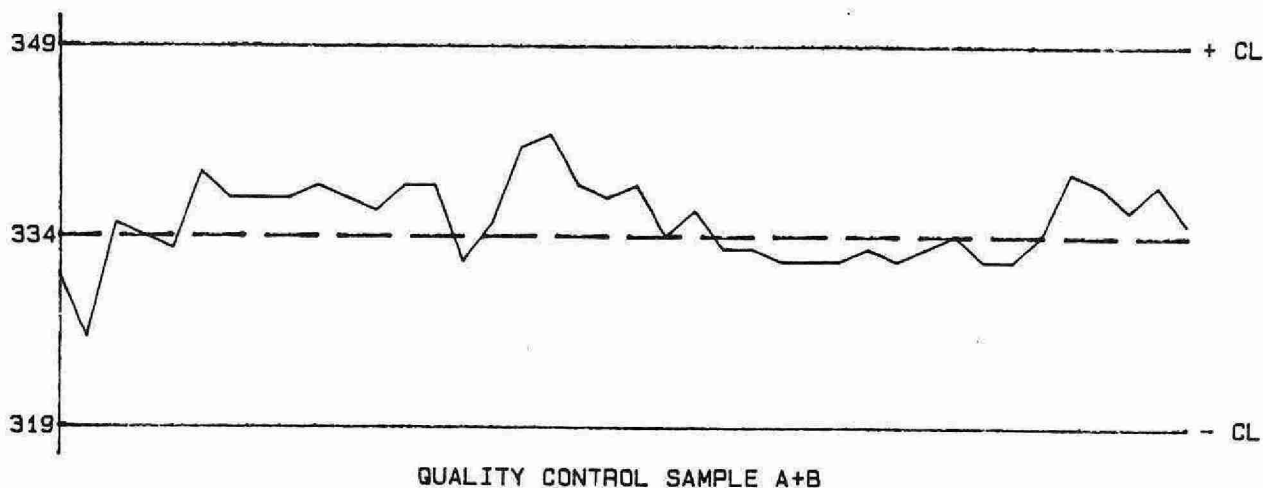
319 to 349 for A+B
 192 to 212 for A-B

DUPLICATES:

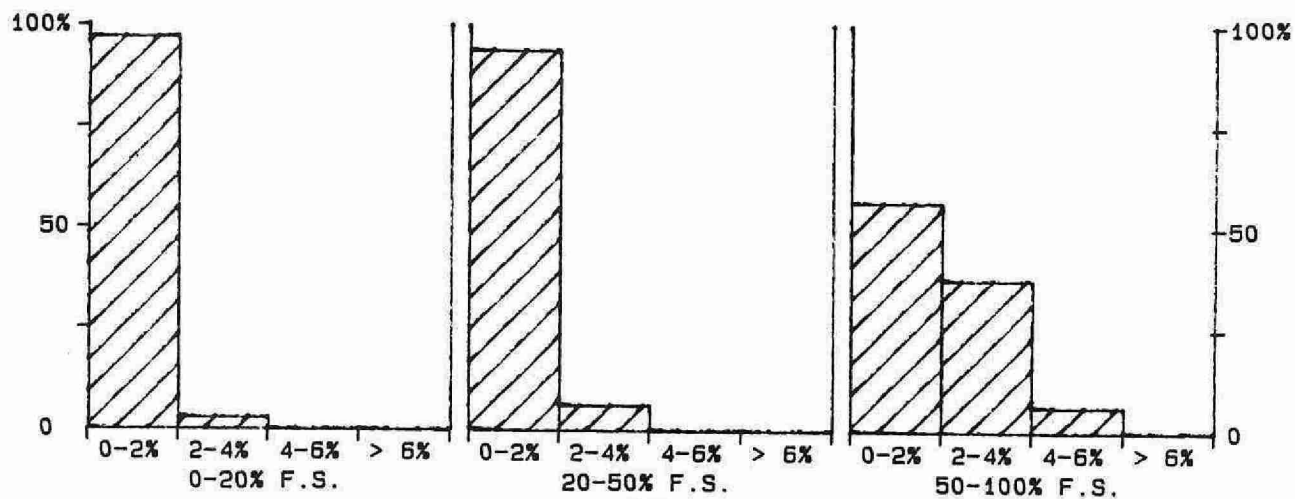
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
30	0.0 - 35.0	1.50	11.4
4	35.0 - 70.0	1.92	3.9
16	70.0 - 175.0	2.77	2.3
16	175 - 350	5.4	2.2
66	Overall	3.2	N/A

QUALITY CONTROL GRAPHS SULPHUR DIOXIDE - PSEQ (UG/FILTER AS SO₂)

FROM: 03/01/88
TO: 22/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-360-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 350 UG/FILTER AS SO₂

***** TURBIDITY *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/74
LIS Test Name Code	: TURB	Units	: FTU
Work Station Code	: RMTURB	Unit Code	: 343000
Method Code	: 002AI1	Supervisor	: F. Lo
Sample Type/Matrix	: Rivers, Lakes, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

The instrument is standardized with sealed standards which are prepared commercially and rated in Formazin Turbidity Units. Samples are placed in the turbidimeter, and results in FTU are read directly from the digital output. Turbidity measurement are based on light scattering at 90 plus or minus 30 degrees of rotation. The instrument compensates for sample colour.

INSTRUMENTATION:

-Hach Ratio 18900 Turbidimeter

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus formazin standards (at least once annually)

CONTROLS:

Calibration : BL plus two standards, e.g. QCA

MODIFICATIONS:

01/04/82 -Hach 2100A turbidimeter was replaced by Hach ratio turbidimeter. As of this date samples are no longer stirred during turbidity measurements, and thus the effect of heavy particulates is minimized as they settle out before the reading is accepted.

01/09/85 -Controls QCA, QCB introduced: these controls are aqueous suspensions of beads composed of styrene-divinylbenzene polymer and are formulated to "match" the performance of formazin standards on the Hach 18900 turbidimeter.

*Insufficient data collected for inclusion in performance report.

18/08/87-New controls (QCA,QCB) were introduced: these consisted of ultrafine metal oxide particulates suspended in a silicone polymer gel. These secondary standards,"Gelex-TM" from Hach, were supported by the instrument manufacturer and provided similar results to the previous controls.

TURBIDITY - RMTURB
QUALITY CONTROL DATA FROM 05/01/88 TO 22/12/88

Lab: Colourimetry

Analytical Range: - to 200 FTU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	217	18.0	18.0	0.0	0.24
b :	217	1.80	1.91	0.11	0.065
a+b :	217	19.80	19.89	0.09	0.239
a-b :	217	16.20	16.07	-0.13	0.262

s.d.(AB): Sw(within run): 0.18 S(between runs): 0.18 S/Sw: 0.95

On any given day the calibration is accepted if the values obtained lie within the ranges:

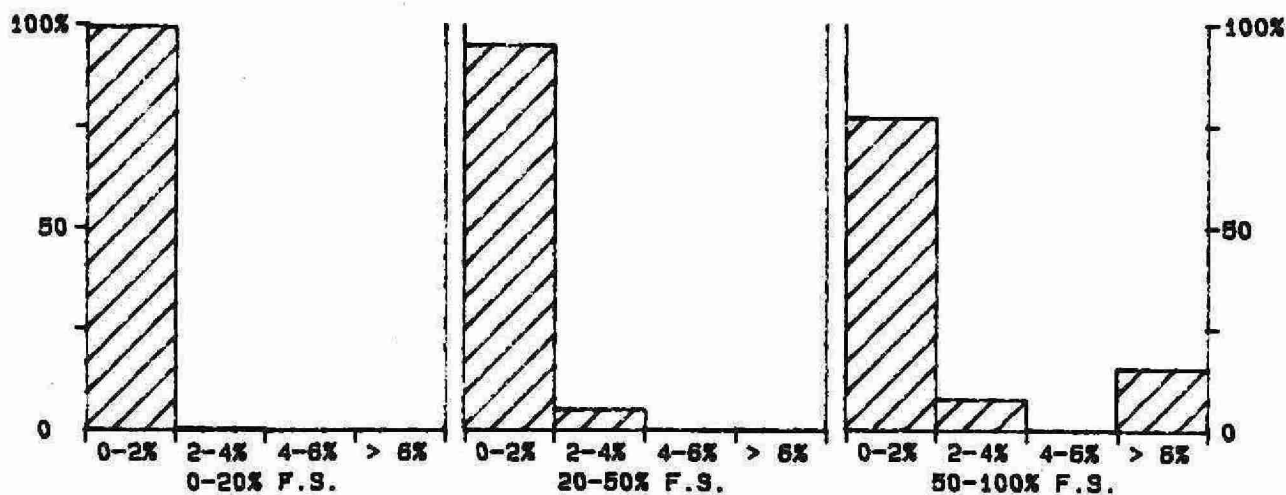
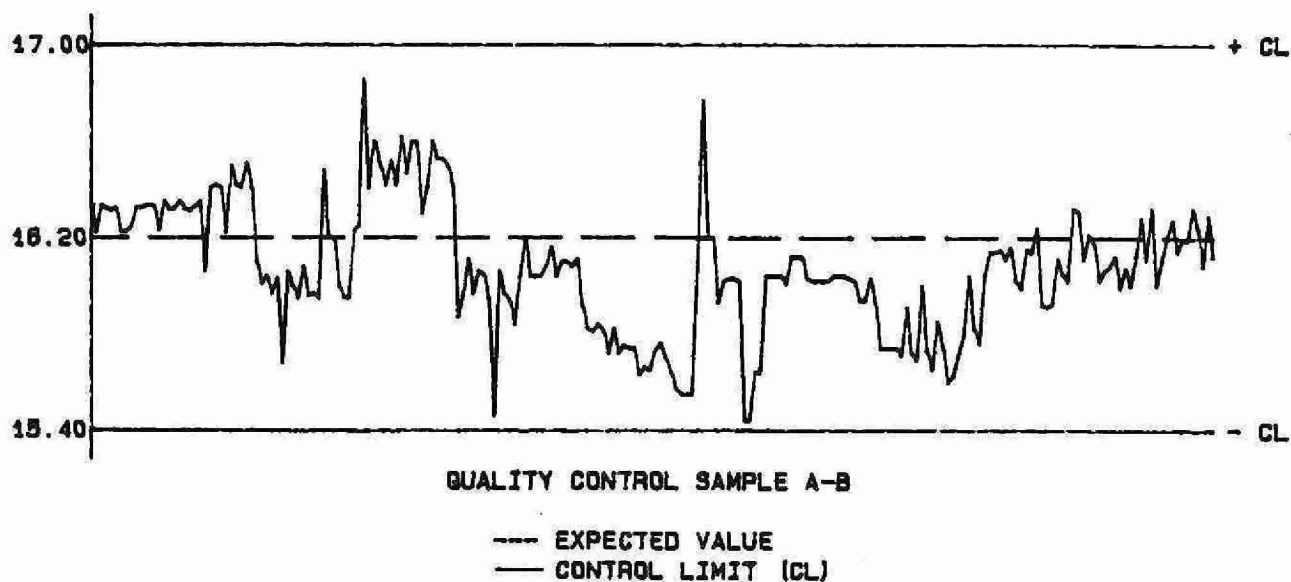
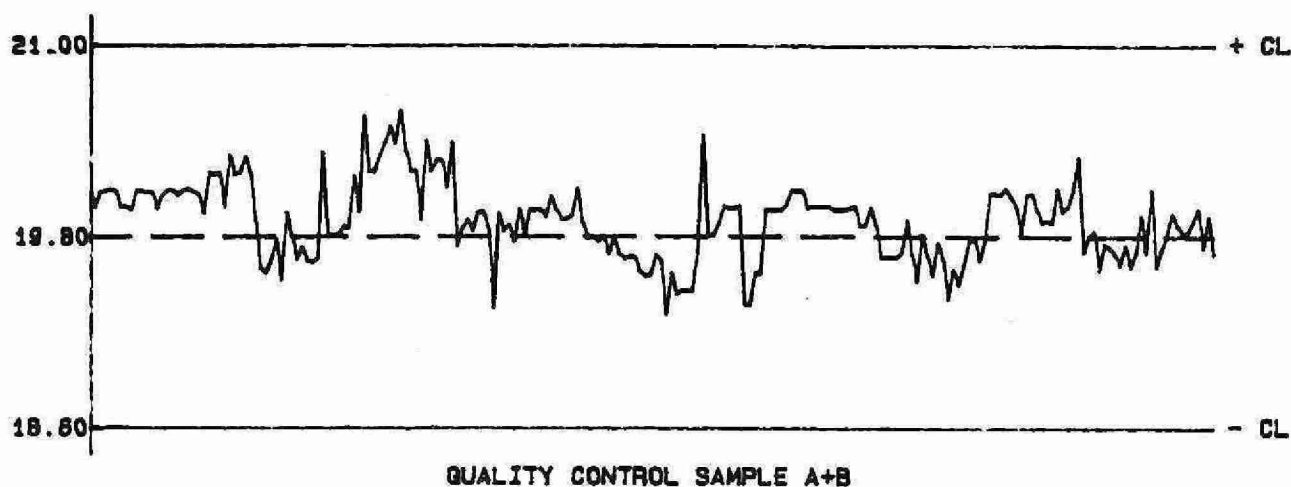
18.60 to 21.00 for A+B
 15.40 to 17.00 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
60	0.00 - 2.00	0.101	8.3
140	2.0 - 20.0	0.42	6.2
39	20 - 100	1.3	2.8
13	100 - 200	4.7	3.1
252	Overall	1.2	N/A

QUALITY CONTROL GRAPHS TURBIDITY - RIVER (FTU)

FROM: 05/01/88
TO: 22/12/88



-363-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 FTU

*** TURBIDITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: Before '74
LIS Test Name Code	: TURB	Units	: FTU
Work Station Code	: WTURB	Unit Code	: 343000
Method Code	: 002A11	Supervisor	: F. Lo
Sample Type/Matrix	: Rivers, Lakes, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

The instrument is standardized with sealed standards which are prepared commercially and rated in Formazin Turbidity Units. Samples are placed in the turbidimeter, and results in FTU are read directly from the digital output. Turbidity measurement are based on light scattering at 90 plus or minus 30 degrees of rotation. The instrument compensates for sample colour.

INSTRUMENTATION:

-Hach Ratio 18900 Turbidimeter

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus formazin standards (at least once annually)

CONTROLS:

Calibration : BL plus two standards, e.g. QCA*

MODIFICATIONS:

01/03/84 -Hach 2100A turbidimeter was replaced by Hach ratio turbidimeter. In the past samples were not stirred during turbidity measurements in the Domestic Water laboratory even though the former instrument (Hach 2100A) possessed this capability. Thus the effect of changing the instrumentation was minimal.

01/09/85 -Controls QCA, QCB introduced: these controls were aqueous suspensions of beads composed of styrene-divinylbenzene polymer and are formulated to "match" the performance of formazin standards on the Hach 18900 turbidimeter.

*Insufficient data collected for inclusion in performance report.

18/08/87 -New controls (QCA,QCB) were introduced: these consisted of ultrafine metal oxide particulates suspended in a silicone polymer gel. These secondary standards, "Gelex-TM" from Hach, were supported by the instrument manufacturer and provided similar results to the previous controls.

TURBIDITY - WATER
QUALITY CONTROL DATA FROM 04/01/88 TO 23/12/88

Lab: Titration

Analytical Range: - to 200 FTU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	210	18.0	18.3	0.3	0.33
b :	210	1.80	1.82	0.02	0.036
a+b :	210	19.80	20.11	0.31	0.351
a-b :	210	16.20	16.46	0.26	0.321

s.d.(AB): Sw(within run): 0.23 S(between runs): 0.23 S/Sw: 1.03

On any given day the calibration is accepted if the values obtained lie within the ranges:

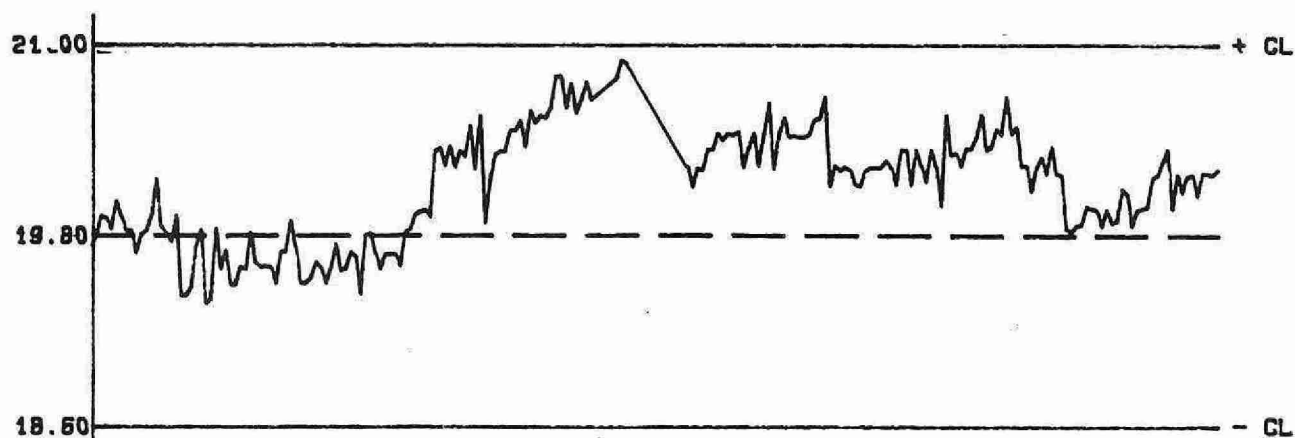
18.60 to 21.00 for A+B
 15.40 to 17.00 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	253	0.00 - 2.00	0.106	15.9
	54	2.0 - 20.0	0.46	6.7
	16	20 - 100	1.5	4.4
	4	100 - 200	1.7	1.4
	327	Overall	0.4	N/A

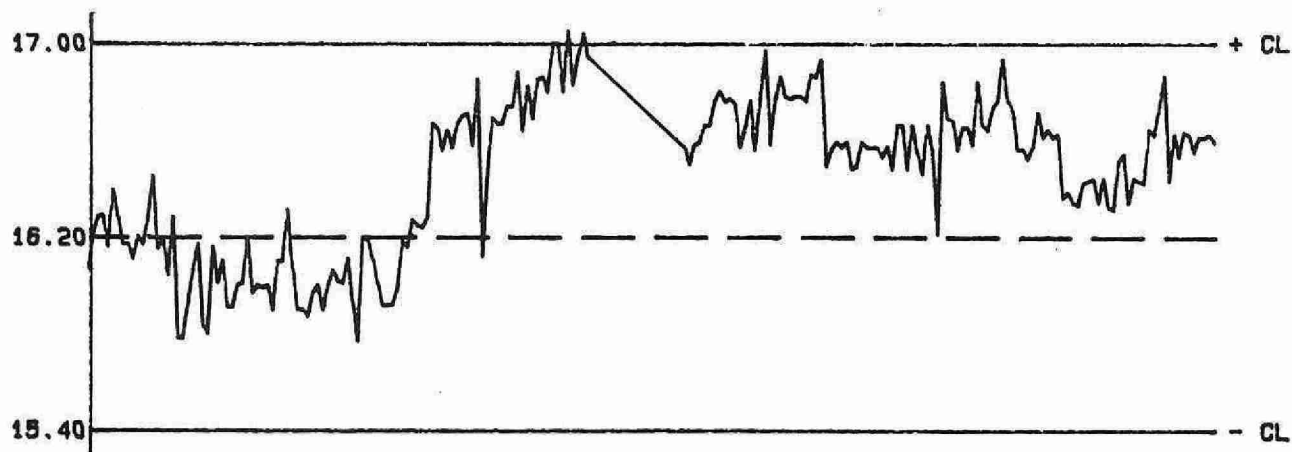
QUALITY CONTROL GRAPHS

TURBIDITY - WATER (FTU)

FROM: 04/01/88
TO: 23/12/88

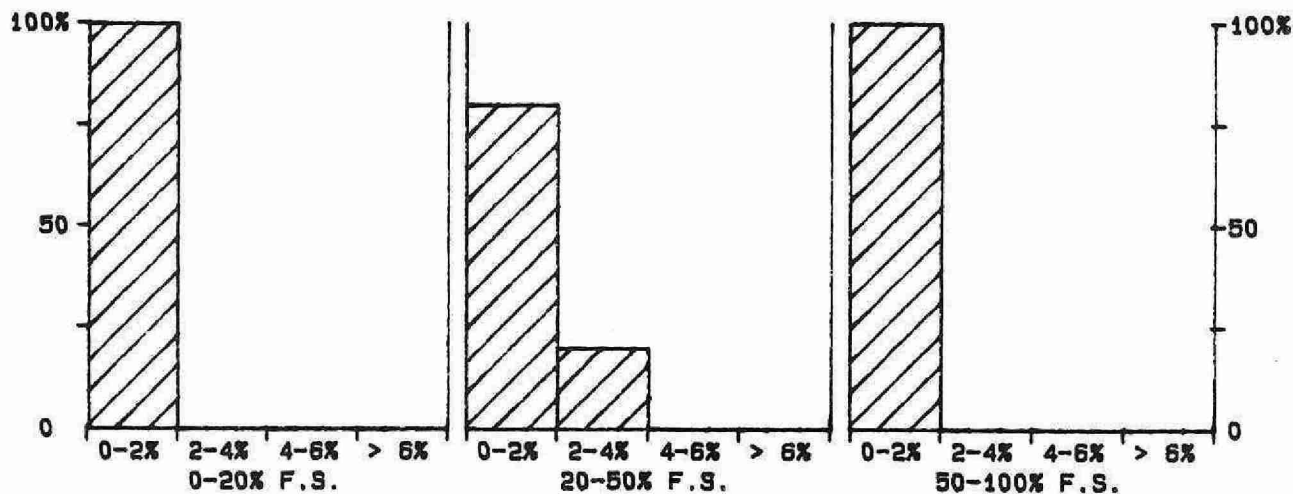


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-366-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 FTU

***** TOTAL ZINC - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ZNUT	Units	: ug/g as Zn
Work Station Code	: DOHMTE	Unit Code	: 073830
Method Code	: 551AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried and ground to <150 um.

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, vortexed and allowed to settle and decanted. The supernatant is analyzed for Zn by AAS at 217.0 nm using an air-acetylene flame.

Approximate absorbance: 0.3 at the full scale value.

Copper, nickel and zinc are also determined on the extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types,
2 method blanks
Drift : BBL plus 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/01/83 -Hot block temperature increased from 160°C to 175°C
06/01/86 -Samples analyzed on Varian AAS1275 (replacing Perkin Elmer 5000)

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal.

Values for recoveries are unknown - average value used.

TOTAL ZINC - SOIL
QUALITY CONTROL DATA FROM 14/03/88 TO 15/11/88

Lab: Dorset Soils

Analytical Range: - to 100.0 ug/g as Zn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	29	79.0	79.5	0.5	1.39
b :	29	30.0	29.8	-0.2	0.88
a+b :	29	109.0	109.3	0.3	1.96
a-b :	29	49.0	49.7	0.7	1.26

s.d.(AB): Sw(within run): 0.89 S(between runs): 1.16 S/Sw: 1.31

On any given day the calibration is accepted if the values obtained lie within the ranges:

101.5 to 116.5 for A+B
 44.0 to 54.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	29	35.5	34.6	1.55
r2 :	29	82.1	81.6	3.65
r3 :	29	38.5	38.4	2.19

DUPLICATES:

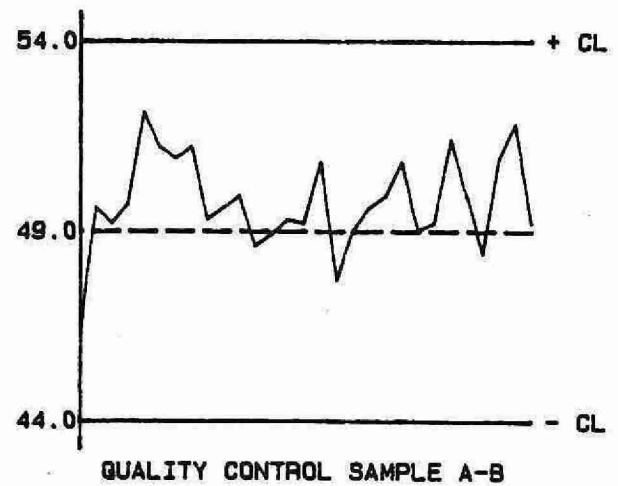
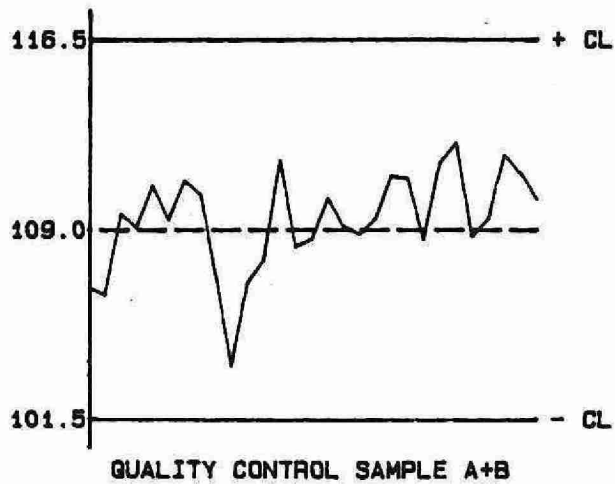
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
23	0.0 - 20.0	1.01	7.2
37	20.0 - 50.0	1.31	4.0
26	50.0 - 100.0	1.67	2.4
86	Overall	1.37	N/A

OTHER CHECKS:

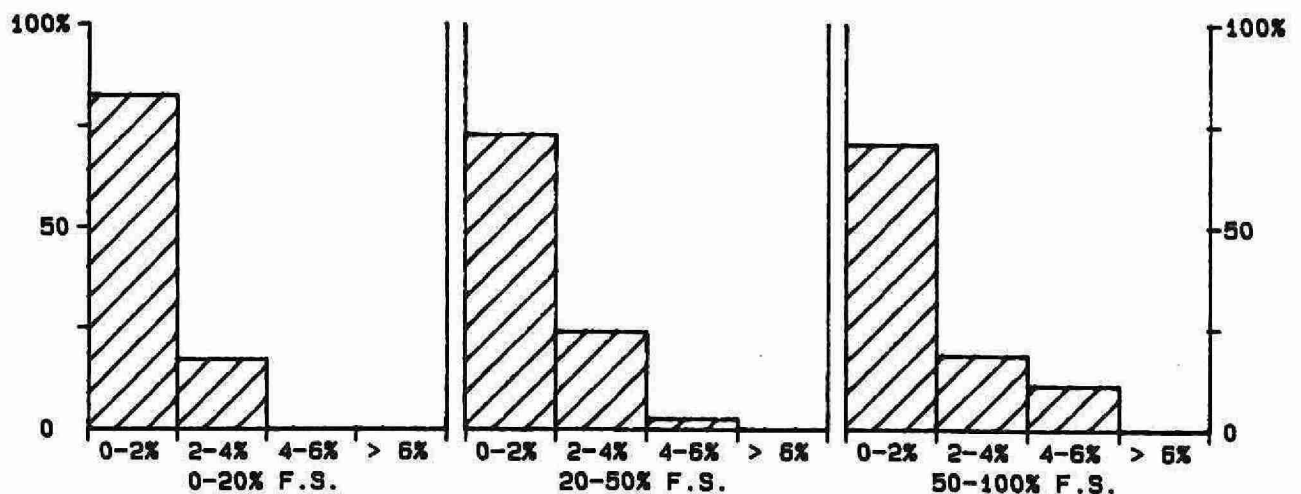
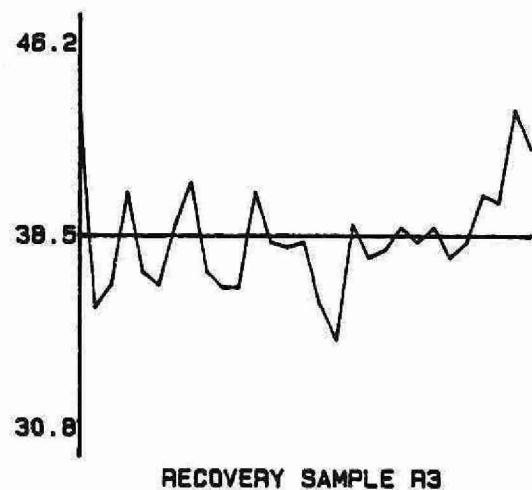
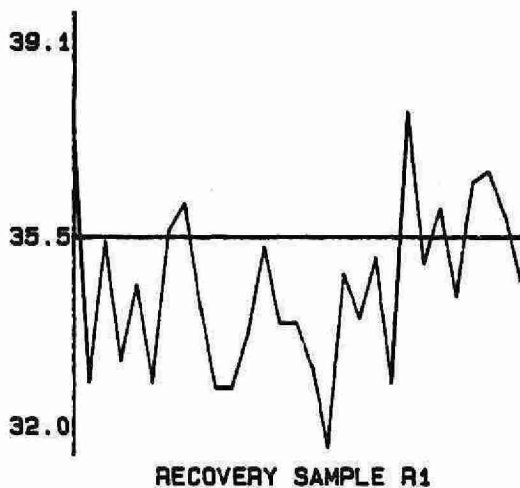
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	29	0.6	0.75

QUALITY CONTROL GRAPHS TOTAL ZINC - SOIL (UG/G AS ZN)

FROM: 14/03/88
TO: 15/11/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-369-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 UG/G AS ZN

***** ZINC *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/03/86
LIS Test Name Code	: ZNUT	Units	: ug/L as Zn
Work Station Code	: DOASV	Unit Code	: 063830
Method Code	: 001PP2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required : 100 mL
Container : 500 mL, acid washed Telfon container,
bagged in a clean room

ANALYTICAL PROCEDURE:

Samples are acidified to 0.1% using Seastar nitric acid in a clean room. Oxygen is removed by nitrogen gas and samples are analyzed using anodic stripping voltammetry on a hanging mercury drop electrode. Change in current when zinc is stripped from mercury drop is proportional to concentration.

INSTRUMENTATION:

Metrohm 646 VA Processor with Model 675 VA Sample Changer.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 2 standards daily

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA + EPA standard.
Duplicate : End of every run (approximately every 8 samples)

ZINC - TOTAL (DOASY)
QUALITY CONTROL DATA FROM 04/01/88 TO 20/12/88

Lab: Dorset

Analytical Range: - to 15.00 ug/L as Zn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	104	8.00	8.04	0.04	0.827
b :	99	2.00	2.23	0.23	0.362
a+b :	92	10.00	10.24	0.24	0.949
a-b :	92	6.00	5.77	-0.23	0.883

s.d.(AB): Sm(within run): 0.624 S(between runs): 0.638 S/Sw: 1.02

On any given day the calibration is accepted if the values obtained lie within the ranges:

5.50 to 14.50 for A+B
3.00 to 9.00 for A-B

DUPLICATES:

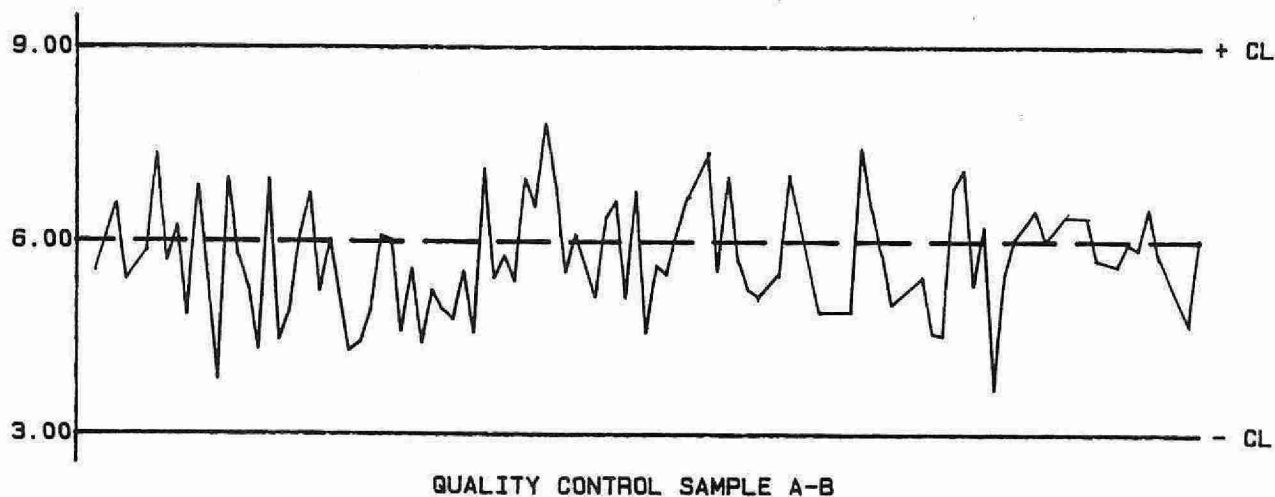
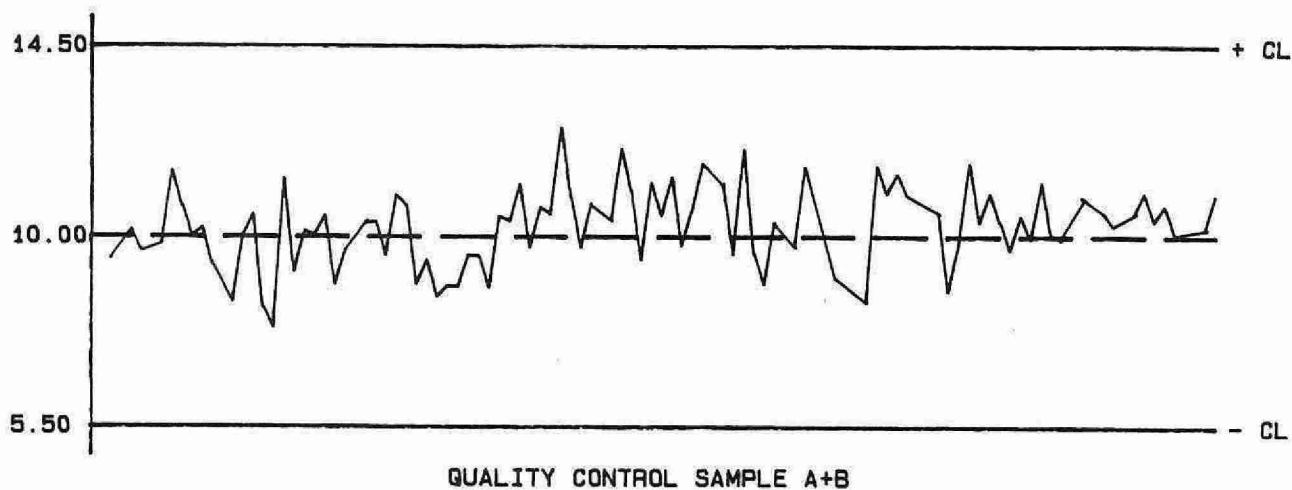
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
6	0.00 - 1.00	0.018	7.0
8	1.00 - 3.00	0.171	8.5
10	3.00 - 5.00	0.643	16.2
12	5.00 - 10.00	0.637	9.2
8	10.00 - 15.00	1.361	11.4
52	Overall	0.725	N/A

OTHER CHECKS:

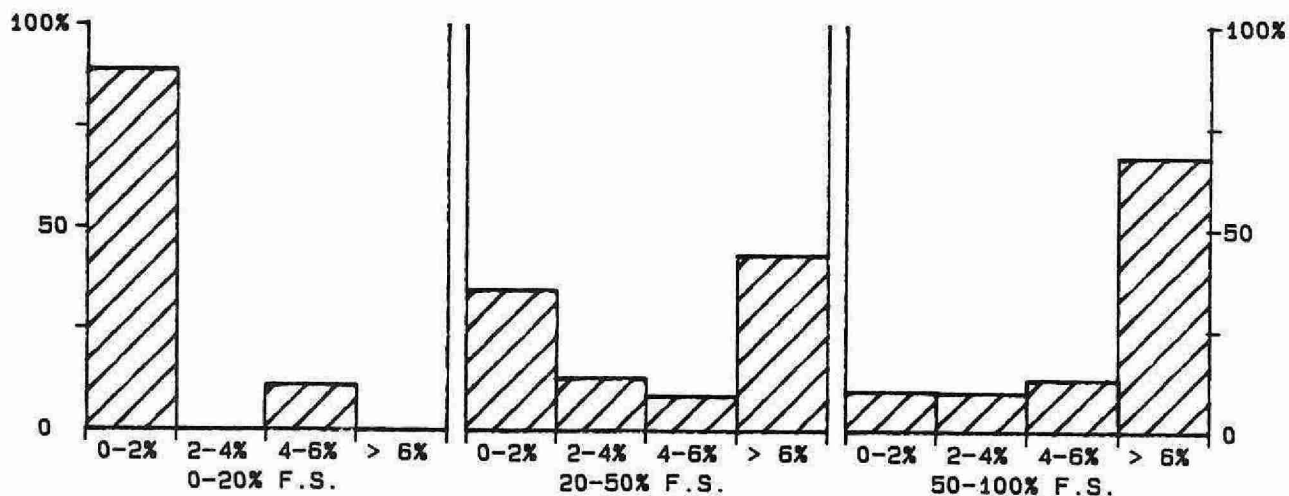
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	110	0.16	0.394

QUALITY CONTROL GRAPHS ZINC - TOTAL (DOASV) (UG/L AS ZN)

FROM: 04/01/88
TO: 20/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



-372-
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10 UG/L AS ZN

METHOD SUMMARIES

MICROBIOLOGY

*****ESCHERICHIA COLI*****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: 1979
LIS Test Name Code	: ECMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: TFC 24	Supervisor	: M. Young
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: Glass, 250 mL
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mTEC agar and incubated for 23 +/- 1 hour at 44.5 +/- 0.5°C to allow for colony development. The temperature is gradually elevated by incubating 10 plates (2 stacks of 5 plates placed in the centre of a cakette) with 2 Pharol jars containing ice (50 mL of water), one placed at each end of the cakette. After incubation the membrane filter is transferred to a pad soaked in urease reagent and is given a reaction time of 15 minutes. All colonies that were yellow on mTEC agar and remain yellow on urease are counted as E. coli. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures:	3	Minimum Increment:	1
Detection Criteria:	10		

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

MODIFICATIONS:

None.

Escherichia coli (ECMF)

QUALITY CONTROL DATA FROM 06/01/88 TO 30/12/88

Lab: Surface Water Analytical Range: 0-150 counts/filter

* DUPLICATES: Within-run precision

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
5	0 - 30	3.80	4.01	106.0
4	31 - 75	7.25	7.01	96.7
2	76 - 150	15.5	11.0	73.3
N/A	> 150	N/A	N/A	N/A

* Includes only data from Oct.26 to Dec.30, 1988

CONTROL FILTERS:

No. of Controls	No. of Positive Controls	% positive
N/A	N/A	N/A

MEDIUM QC: mTEC agar (Selective) vs
Brain Heart Infusion agar (Non-selective)
Test organism - E. coli

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
30	0 - 30	3.0	2.98	77.8
36	31 - 75	9.78	8.11	82.9
25	76 - 150	16.8	14.6	86.9
N/A	> 150	N/A	N/A	N/A

MEDIUM QC: Samples - Previous vs Current Medium Batch

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
12	0 - 30	3.83	3.12	81.5
3	31 - 75	6.0	4.40	73.3
N/A	76 - 150	N/A	N/A	N/A
N/A	> 150	N/A	N/A	N/A

*****FECAL COLIFORMS*****

IDENTIFICATION:

Laboratory	: Surface and Waste Water	Method Introduced	: April 1979
	: Municipal Drinking Water		
LIS Test Name Code	: FCMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
	: WQMFPFA		
Method Code	: TF1 24	Supervisor	: M. Young
			: J. Clark
Sample Type/Matrix	: Surface, Waste and Drinking Waters		

SAMPLING:

Quantity Required : 100 mL
Container : Glass, 250 mL
Preservative : Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mTEC agar and incubated for 23 +/- 1 hours at 44.5 +/- 0.5°C to allow for colony development. The temperature is gradually elevated by incubating 10 plates (2 stacks of 5 plates placed in the centre of a caketee) with 2 Pharol jars containing ice (50 mL of water), one placed at each end of the caketee. All yellow, yellow brown, and yellow green colonies are counted as fecal coliforms. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3 Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC : Target organism count on selective medium vs nonselective medium.
: Comparison of target counts on an old vs a new batch.

MODIFICATIONS:

None.

FECAL COLIFORMS (FCMF)

QUALITY CONTROL DATA FROM 06/01/88 TO 30/12/88

Lab: Municipal Drinking Water

Analytical Range: 0-150 counts/filter

DUPLICATES: Within-run precision

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
58	0 - 30	1.22	1.19	97.5
7	31 - 75	3.14	2.65	84.4
3	76 - 150	6.0	4.28	71.3
N/A	> 150	N/A	N/A	N/A

CONTROL FILTERS:

No. of Controls	No. of Positive Controls	% positive
N/A	N/A	N/A

MEDIUM QC: mTEC agar (Selective) vs
Brain Heart Infusion agar (Non-selective)
Test organism - E. coli

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
2	0 - 30	2.0	1.41	70.5
3	31 - 75	3.67	2.68	73.0
3	76 - 150	3.67	2.86	77.9
N/A	> 150	N/A	N/A	N/A

FECAL COLIFORMS (FCMF)

QUALITY CONTROL DATA FROM 06/01/88 TO 30/12/88

Lab: Surface Water

Analytical Range: 0-150 counts/filter

* DUPLICATES: Within-run precision

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
8	0 - 30	3.88	3.68	94.8
6	31 - 75	6.33	5.61	88.6
8	76 - 150	10.50	9.80	93.3
N/A	> 150	N/A	N/A	N/A

* Includes only data from Oct.26 - Dec.30, 1988
Samples include surface water and effluents.

CONTROL FILTERS:

No. of Controls	No. of Positive Controls	% positive
N/A	N/A	N/A

MEDIUM QC: mTEC agar (Selective) vs
Brain Heart Infusion agar (Non-selective)
Test organism - E. coli

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
30	0 - 30	3.0	2.98	77.8
36	31 - 75	9.78	8.11	82.9
25	76 - 150	16.8	14.6	86.9
N/A	> 150	N/A	N/A	N/A

MEDIUM QC: Samples - Previous vs Current Medium Batch

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
12	0 - 30	3.83	3.12	81.5
3	31 - 75	6.0	4.40	73.3
N/A	76 - 150	N/A	N/A	N/A
N/A	> 150	N/A	N/A	N/A

*****FECAL STREPTOCOCCUS*****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: Apr. 1972
LIS Test Name Code	: FSMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: EF 48	Supervisor	: M. Young
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required : 100 mL
Container : Glass, 250 mL
Preservative : Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mEnterococcus agar and incubated for 48 +/- 3 hours at 35 +/- 0.5°C to allow for colony development. All colonies that are red, maroon or pink are counted as fecal streptococcus. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3 Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

Duplicate samples and blank filter between each sample.
Medium QC : Target organism count on selective medium vs non selective medium.
 : Comparison of target counts on an old vs a new batch.

MODIFICATIONS:

None.

FECAL STREPTOCOCCUS (FSMF)

QUALITY CONTROL DATA FROM 06/01/88 TO 30/12/88

Lab: Surface Water

Analytical Range: 0-150 counts/filter

* DUPLICATES: Within-run precision

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
12	0 - 30	3.50	2.81	80.3
4	31 - 75	4.0	2.96	74
2	76 - 150	6.5	6.5	100
N/A	> 150	N/A	N/A	N/A

* Includes only data from Oct.26 - Dec.30, 1988

CONTROL FILTERS:

No. of Controls	No. of Positive Controls	% positive
N/A	N/A	N/A

MEDIUM QC: mEnterococcus agar (Selective) vs
Brain Heart Infusion agar (Non-selective)
Test organism - S. faecalis

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
22	0 - 30	3.86	3.58	92.8
37	31 - 75	4.61	4.13	91.6
11	76 - 150	10.1	7.92	78.4
N/A	> 150	N/A	N/A	N/A

*****HETEROTROPHS*****

IDENTIFICATION:

Laboratory	: Surface and Waste Water	Method Introduced	: April 1, 1979
	: Municipal Drinking Water		
LIS Test Name Code	: HB35MF	Units	: Counts/mL
Work Station Code	: MSBACIND	Unit Code	: 301532
	: WQMFFPA		
Method Code	: SF 48	Supervisor	: M. Young
			: J. Clark
Sample Type/Matrix	: Drinking Water		

SAMPLING:

Quantity Required : 100 mL
Container : Glass, 250 mL
Preservative : Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mSPCI agar and incubated for 48 +/- 3 hours at 35 +/- 0.5°C to allow for colony development. All colonies are counted as heterotrophs. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3 Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC :Colony counts are obtained using a pure culture and comparing the heterotrophic medium (mSPCI) to the nonselective medium (BHIA).
:Comparison of colony counts on an old vs a new batch are done using water samples.

MODIFICATIONS:

None.

HETEROTROPHS (HB35MF)

QUALITY CONTROL DATA FROM 06/01/88 TO 30/12/88

Lab: Municipal Drinking Water

Analytical Range: 0-150 counts/filter

DUPLICATES: Within-run precision

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
20	0 - 30	1.90	1.67	87.9
3	31 - 75	3.0	2.35	78.3
N/A	76 - 150	N/A	N/A	N/A
N/A	> 150	N/A	N/A	N/A

CONTROL FILTERS:

No. of Controls	No. of Positive Controls	% positive
644	107	16.6

MEDIUM QC: mHPC agar (Selective) vs
Brain Heart Infusion agar (Non-selective)
Test organism - A. calcoaceticus

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
8	0 - 30	3.38	2.59	76.6
3	31 - 75	12.3	9.67	78.6
5	76 - 150	13.4	11.0	82.1
N/A	> 150	N/A	N/A	N/A

MEDIUM QC: Samples - Previous vs Current Medium Batch

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
7	0 - 30	1.86	1.39	74.7
3	31 - 75	2.0	1.53	76.5
9	76 - 150	3.78	2.89	76.5
N/A	> 150	N/A	N/A	N/A

*****KLEBSIELLA SPP.*****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: June 1986
LIS Test Name Code	: KLMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: KF 48	Supervisor	: M. Young
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required : 100 mL
Container : Glass, 250 mL
Preservative : Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mK2 agar and incubated for 42 +/- 2 hours at 35 +/- 0.5°C to allow for colony development. All colonies that are yellow and greater than 0.75 mm are counted as Klebsiella spp. An ideal counting range is 10 to 50 colonies per filter.

REPORTING:

Maximum Significant Figures: 3 Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC : Target organism count on selective medium vs nonselective medium.
: Comparison of target counts on an old vs a new batch.

MODIFICATIONS:

None.

* NOTE: 1988 data not available for publication.

PRESENCE-ABSENCE TEST

IDENTIFICATION:

Laboratory	: Municipal Drinking Water	Method Introduced	: 1968
LIS Test Name Code	: PABOT	Units:Present/Absent/100mL	
Work Station Code	: WQMFFA	Unit Code	: 999000
Method Code	: LLSB10	Supervisor	: J. Clark
Sample Type/Matrix	: Drinking Water		

SAMPLING:

Quantity Required	: 100 mL
Container	: Glass, 250 mL
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

A 100 mL volume of sample is added to a presence-absence (P-A) bottle. The bottle is incubated at 35°C for 4 to 5 days and examined every 24 hours for acid or acid and gas formation. When a positive reaction for acid or acid and gas occurs, the inoculum is transferred to confirmatory media to determine the presence of total coliforms, fecal coliforms and other indicator organisms.

REPORTING:

Microbiological parameters are reported either as present or absent per 100 mL of sample.

CONTROLS:

A blank control sample is included for every 20 to 25 samples.

Medium QC : P-A broth batches are checked for sterility at 20° and 35°C and inoculation of the medium is done with E. coli to determine its response. Dilutions of E. coli are passed through membrane filters which are subsequently placed on filter pads saturated with P-A broth and on an enrichment medium, such as Brain Heart Infusion Agar, to compare numbers of colonies recovered.

MODIFICATIONS:

Initially the P-A broth was formulated using MacConkey broth with tryptone as described in HAMES, June 1, 1976. Subsequently, a Lactose broth and Lauryl Tryptose broth formulation was described in HAMES, December 1983. A commercial preparation of this medium is now used, known as Presence-Absence broth. The latest revision of the P-A methodology was listed as WQPA-100 and was written up in early 1988.

PRESENCE - ABSENCE TEST (PABOT)

QUALITY CONTROL DATA FROM 06/01/88 TO 30/12/88

Lab: Municipal Drinking Water

CONTROL BLANKS:

No. of Controls	No. of Positive Controls	% positive
<u>931</u>	<u>0</u>	<u>0</u>

MEDIUM QC: PA broth(Selective) vs Brain Heart Infusion agar (Non-selective).

Test organism - E. coli

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
<u>3</u>	<u>0 - 30</u>	<u>4.67</u>	<u>3.37</u>	<u>72.2</u>
29	31 - 75	3.63	2.95	81.3
39	76 - 150	4.90	4.15	84.7
N/A	> 150	N/A	N/A	N/A

*****PSEUDOMONAS AERUGINOSA*****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: May 1980
LIS Test Name Code	: PSAMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: PF 48	Supervisor	: M. Young
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required : 100 mL
Container : Glass, 250 mL
Preservative : Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mPA agar and incubated for 48 +/- 2 hours at 41.5 +/- 0.5°C to allow for colony development. All colonies that are dark brown, brown with darkened centers, tan and usually very flat in appearance are counted as Pseudomonas aeruginosa. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3 Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC : Target organism count on selective medium vs nonselective medium.
: Comparison of target counts on an old vs a new batch.

MODIFICATIONS:

None.

Pseudomonas aeruginosa (PSAMF)

QUALITY CONTROL DATA FROM 06/01/88 TO 30/12/88

Lab: Surface Water Analytical Range: 0-150 counts/filter

* DUPLICATES: Within-run precision

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
9	0 - 30	2.56	2.92	114
N/A	31 - 75	N/A	N/A	N/A
2	76 - 150	3.0	2.12	70.7
N/A	> 150	N/A	N/A	N/A

* Includes only data from Oct.26 - Dec.30, 1988

MEDIUM QC: mPA agar (Selective) vs
Brain Heart Infusion agar (Non-selective)
Test organism - P. aeruginosa

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
20	0 - 30	2.70	2.17	80.4
9	31 - 75	3.78	3.07	81.2
19	76 - 150	8.21	7.72	94.0
N/A	> 150	N/A	N/A	N/A

MEDIUM QC: Samples - Previous vs Current Medium Batch

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
14	0 - 30	3.50	3.41	97.4
7	31 - 75	6.43	5.20	80.9
N/A	76 - 150	N/A	N/A	N/A
N/A	> 150	N/A	N/A	N/A

*****TOTAL COLIFORMS*****

IDENTIFICATION:

Laboratory	: Surface and Waste Water	Method Introduced	: Jan. 1971
	: Municipal Drinking Water		
LIS Test Name Code	: TCMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
	: WQMFEPA		
Method Code	: LF 22	Supervisor	: M. Young
			: J. Clark
Sample Type/Matrix	: Surface Water, Drinking Water		

SAMPLING:

Quantity Required	: 100 mL
Container	: Glass, 250 mL
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mENDO LES agar and incubated for 22 +/- 2 hours at 35 +/- 0.5°C to allow for colony development. All colonies with a dull to bright metallic green-gold sheen are counted as coliforms. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures:	3	Minimum Increment:	1
Detection Criteria:	10		

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

MODIFICATIONS:

None.

TOTAL COLIFORMS (TCMF)

QUALITY CONTROL DATA FROM 06/01/88 TO 30/12/88

Lab: Municipal Drinking Water

Analytical Range: 0-150 counts/filter

DUPLICATES: Within-run precision

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
74	0 - 30	1.41	1.40	99.3
16	31 - 75	3.06	2.29	74.8
5	76 - 150	5.0	3.65	73.0
N/A	> 150	N/A	N/A	N/A

CONTROL FILTERS:

No. of Controls	No. of Positive Controls	% positive
3786	101	2.7

MEDIUM QC: mEndo agar LES (Selective) vs
Brain Heart Infusion agar (Non-selective)
Test organism - E. coli

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
10	0 - 30	1.50	1.25	83.3
16	31 - 75	3.0	2.24	74.7
31	76 - 150	4.55	3.60	79.1
	> 150			

TOTAL COLIFORMS (TCMF)

QUALITY CONTROL DATA FROM 06/01/88 TO 30/12/88

Lab: Surface Water Analytical Range: 0-150 counts/filter

* DUPLICATES: Within-run precision

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
4	0 - 30	2.50	1.94	77.6
8	31 - 75	4.50	3.71	82.4
2	76 - 150	15.0	14.0	93.3
N/A	> 150	N/A	N/A	N/A

* Includes only data from Oct.26 - Dec.30, 1988

CONTROL FILTERS:

No. of Controls	No. of Positive Controls	% positive
N/A	N/A	N/A

MEDIUM QC: mEndo agar LES (Selective) vs
Brain Heart Infusion agar (Non-selective)
Test organism - E. coli

Number of Data Pairs	Counts per filter	Mean diff.	Std. Dev.	Coefficient of var.(%)
2	0 - 30	5.0	3.61	72.2
2	31 - 75	10.0	7.38	73.8
N/A	76 - 150	N/A	N/A	N/A
N/A	> 150	N/A	N/A	N/A

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GLOSSARY

AAS	- Atomic Absorption Spectrophotometer
Abs	- Absorbance
Av	- Average
Bl	- Blank
C	- Degrees Centigrade
cm	- Centimeter
Concn	- Concentration
Date	- Day/Month/Year
DDW	- Deionized, distilled water
DW	- Distilled water
FTU	- Formazin Turbidity Units
g	- Gram
HAMES	- <i>"Handbook of Analytical Methods for Environmental Samples"</i> , M.O.E.
HOAC	- Acetic Acid
HZU	- Hazen Units
L	- Litre
LAB	- Laboratory
LIS	- Laboratory Information System
LTBL	- Long Term Blank
M	- Molar
meq	- Milliequivalent
mg	- Milligram
mil	- One-thousands of an inch
min	- Minute
mL	- Millilitre
mm	- Millimeter
N	- Normal
N/A	- Not Available or Not Applicable
nm	- Nanometer
oz	- Ounce
QC	- Quality Control
R	- Recovery
rpm	- Revolutions per minute
S	- Between run standard deviation for QC
S ₁	- Standard deviation
S ₂	- Standard deviation for duplicates

S_w	- Within run standard deviation for QC
S. class	- Weights that have not been certified
Standard Cal	- Colourimeter setting to control electronic expansion
STD	- Standard
TCU	- True Colour Units
u	- Micrometer
ueq	- Microequivalent
ug	- Microgram
uS	- Micro-Siemen
V/V	- Concentration based on volume measurements

APPENDIX

APPENDIX A

W & T:

Prior to 1985, W was the minimum detectable amount, and T was 1.645 times the standard deviation of duplicates in a concentration range of about 0-20% of full scale. The W value was given to the client to indicate the smallest amount that could be determined when the actual response was zero. In 1985, T was changed to three times the standard deviation of the same duplicates (reference 3). W was changed only where the minimum amount had changed. The increase in T was made to be consistent with recommendations by the American Chemical Society (reference 8) and to provide a level, above which, data users could have more than 99% confidence that a result obtained was above zero.

To provide a consistent Laboratory Services Branch approach to data reporting, the Water Quality Section now calculates W from the standard deviation of duplicates (S_2), near zero, by rounding down to the nearest 1, 2 or 5 digit. T is five times W. The latest calculations, valid at date of publication for W and T values of all active workstations, are contained in this report.

APPENDIX B

PARAMETER	UNITS	WORK STATION	TEST CODE	FULL SCALE	W	T
Acid Ammon. Ox.....	% as Al.....	DOMETOX.....	ALEOX.....	2.0.....	0.01.....	0.05
	% as Fe.....	DOMETOX.....	FEEOX.....	2.0.....	0.01.....	0.05
	% as Mn.....	DOMETOX.....	MNEOX.....	0.1.....	0.001.....	0.005
	% as Si.....	DOMETOX.....	SIEOX.....	0.25.....	0.01.....	0.05
Acidity - Gran.....	mg/L CaCO ₃	DOT.....	ACDG.....	1000.....	5.....	25
	ueq/L as H.....	PHACD.....	ACDG.....	1000.....	1.....	5
Acidity - TFE.....	mg/L CaCO ₃	DOT.....	ACDT.....	50.....	0.2.....	1
		PHACD.....	ACDT.....	100.....	0.05.....	0.25
Alkalinity-Gran.....	mg/L CaCO ₃	DOT.....	ALKTI.....	25.....	0.05.....	0.25
		RATS.....	ALKTI.....	25.....	N/A.....	N/A
Alkalinity-TFE.....	mg/L CaCO ₃	DOT.....	ALKT.....	100.....	0.05.....	0.25
		RATS.....	ALKT.....	1000.....	0.2.....	1
		WATS.....	ALKT.....	1000.....	0.2.....	1
		WQSDIRT.....	ALKT.....	1000.....	0.5.....	2.5
Alk - TFE @4.5.....	mg/L CaCO ₃	DOT.....	ALKT.....	80.....	0.05.....	0.25
Aluminum - Xca.....	ug/g as Al.....	DOSOLAL.....	ALECA.....	40.....	0.2.....	1.0
Aluminum - CV.....	ug/L as Al.....	DOALSP.....	ALEXCV.....	1000.....	2.....	10
			ALNDCV.....	1000.....	2.....	10
Aluminum - Xdi.....	% wt as Al.....	DOMETDI.....	ALEDI.....	1.....	0.01.....	0.05
Aluminum - Xpy.....	% wt as Al.....	DOMETALX.....	ALEPY.....	0.5.....	0.01.....	0.05
Aluminum - Xsc.....	meq/100g Al.....	DOCATION.....	ALESC.....	2.5.....	0.01.....	0.05
Aluminum-Total.....	ug/L as Al.....	DOAAS.....	ALUT.....	200.....	1.....	5
Cadmium-Total.....	ug/L as Cd.....	DOAAS.....	CDUT.....	2.....	0.01.....	0.05
Calcium.....	mg/L as Ca.....	PRAA.....	CAUR.....	2.....	0.02.....	0.1
		PRAAS.....	CAUR.....	8.....	0.05.....	0.25
		RMAAS.....	CAUR.....	40.....	0.1.....	0.5
		WAAS.....	CAUR.....	200.....	0.2.....	1
Calcium - Xca.....	meq/100g Ca.....	DOCATION.....	CAESC.....	5.....	0.01.....	0.05
Carbon-Diss Inor.....	mg/L as C.....	DODIC.....	DIC.....	10.....	0.02.....	0.1
		ROM.....	DIC.....	40.....	0.2.....	1
Carbon-Diss Org.....	mg/L as C.....	ROM.....	DOC.....	20.....	0.1.....	0.5
Carbon-Organic.....	% wt as C.....	DOOXMAT.....	ORGC.....	100.....	0.01.....	0.05
Chloride.....	mg/L as Cl.....	COCL.....	CLIDUR.....	100.....	0.2.....	1
		PRICI.....	CLIDUR.....	2.....	0.01.....	0.05
	ug/filt Cl.....	PRLOV.....	CLIDUR.....	100.....	1.....	5
Chlorophyll-a.....	ug/L.....	RCHLO.....	CHLRAT.....	10.....	0.2.....	1
Chlorophyll-acid.....	ug/L.....	RCHLO.....	CHLRAC.....	10.....	1.....	5
Chlorophyll-b.....	ug/L.....	RCHLO.....	CHLRBT.....	10.....	0.1.....	0.5
Clay.....	% bt wt.....	DOPARTSZ.....	CLAY.....	100.....	1.....	5
Colour - True.....	HZU.....	DOCC.....	COLTR.....	100.....	1.....	5
	TCU.....	WCOL.....	COLTR.....	100.....	0.5.....	2.5

PARAMETER	UNITS	WORK STATION	TEST CODE	FULL SCALE	W	T
Conductivity.....	uS/cm @25°	DOCC.....	COND25.....	300.....	0.2.....	1
		PRCON.....	COND25.....	100.....	0.2.....	1
		PRICI.....	COND25.....	100.....	0.2.....	1
		RATS.....	COND25.....	2000.....	1.....	5
		WATS.....	COND25.....	2000.....	1.....	5
		WQSDIRT.....	COND25.....	10000.....	5.....	25
Copper.....	ug/L as Cu.....	DOASV.....	CUUT.....	4.....	0.3.....	1.5
	ug/g as Cu.....	DOHMTE.....	CUUT.....	50.....	0.2.....	1
Fluoride.....	ug/L as F.....	DOSPF.....	FFIDUR.....	100.....	0.2.....	1
	mg/L as F.....	WFNO ₃	FFIDUR.....	2.....	0.01.....	0.05
Iron - Xdi.....	% wt as Fe.....	DOMETDI.....	FEEDI.....	2.....	0.01.....	0.05
Iron - Xpy.....	% wt as Fe.....	DOMETALX.....	FEOPY.....	1.....	0.01.....	0.05
Lead - Total.....	ug/g as Pb.....	DOHMTE.....	PBUT.....	50.....	0.2.....	1.0
Lead.....	ug/L as Pb.....	DOASV.....	PBUT.....	2.....	0.3.....	1.5
Magnesium.....	mg/L as Mg.....	PRAA.....	MGUR.....	0.5.....	0.005.....	0.025
		PRAAS.....	MGUR.....	2.....	0.005.....	0.025
		RMAAS.....	MGUR.....	10.....	0.02.....	0.1
		WAAS.....	MGUR.....	50.....	0.1.....	0.5
Magnesium-Xsc.....	meq/100g Mg.....	DOCAION.....	MGESC.....	2.5.....	0.01.....	0.05
Nickel - Total.....	ug/g as Ni.....	DOHMTE.....	NIUT.....	50.....	0.2.....	1
Nitrogen-NH ₃ +NH ₄	ug/L as N.....	DONUT.....	NNHTFR.....	1000.....	1.....	5
	mg/L as N.....	PRAM.....	NNHTUR.....	2.....	0.002.....	0.01
			NNHTFR.....	2.....	0.002.....	0.01
	ug/filt N.....	PRAM.....	NNHTFR.....	50.....	0.05.....	0.25
	mg/L as N.....	PRNUT.....	NNHTFR.....	5.....	0.005.....	0.025
			NNHTUR.....	5.....	0.005.....	0.025
		RNDNP.....	NNHTFR.....	2.....	0.002.....	0.01
		SDNP.....	NNHTFR.....	50.....	0.05.....	0.25
Nitrogen - NO ₃	mg/L as N.....	PRICI.....	NNO3UR.....	2.....	0.01.....	0.05
	ug/filt N.....	PRLOV.....	NNO3UR.....	100.....	0.5.....	2.5
		PRSEQ.....	NNO3FR.....	50.....	0.2.....	1.0
Nitrogen-NO ₃ +NO ₂	ug/L as N.....	DONUT.....	NNOTFR.....	500.....	2.....	10
	mg/L as N.....	RNDNP.....	NNOTFR.....	5.....	0.005.....	0.025
		SDNP.....	NNOTFR.....	50.....	0.05.....	0.25
		WFNO ₃	NNOTUR.....	20.....	0.1.....	0.5
Nitrogen - NO ₂	mg/L as N.....	RNDNP.....	NNO2FR.....	0.25.....	0.001.....	0.005
		SDNP.....	NNO2FR.....	2.....	0.005.....	0.025
Nitrogen-T Kjdl.....	mg/L as N.....	RTNP.....	NNTKUR.....	2.....	0.02.....	0.1
		STKNP.....	NNTKUR.....	25.....	0.05.....	0.25
Oxygen - BOD.....	mg/L as O.....	SBOD5.....	BOD5.....	400.....	0.2.....	1.0
Oxygen - COD.....	mg/L as O.....	RCOD.....	COD.....	100.....	1.....	5

PARAMETER	UNITS	WORK STATION	TEST CODE	FULL SCALE	W	T
Oxygen - COD	mg/L as O	RCOD	CODF	100	1	5
		SBCOD	COD	500	2	10
pH		DOCOP	PH	14	N/A	N/A
		DOT	PH	14	N/A	N/A
		PHACD	PH	14	N/A	N/A
		RATS	PH	14	N/A	N/A
		WATS	PH	14	N/A	N/A
		WQSDIRT	PH	14	N/A	N/A
pH - Soil Xca		DOSOILPH	PHECA	14	N/A	N/A
pH - Soil Xw		DOSOILPH	PHEW	14	N/A	N/A
Phenolics	ug/L Phenol	ROPHEN	PHNOL	50	0.2	1
Phosphorus-Sol	mg/L as P	RNDNP	PPO4FR	0.125	0.0005	0.0025
		SDNP	PPO4FR	10	0.02	0.1
Phosphorus-Tot	ug/L as P	DOP	PPUT1	200	0.2	1
	mg/L as P	RTNP	PPUT	0.2	0.002	0.01
		STKNP	PPUT	5	0.02	0.1
Potassium	mg/L as K	PRAA	KKUR	1	0.005	0.025
		PRAAS	KKUR	1	0.01	0.05
	ug/filt K	PRLOV	KKUR	50	0.5	2.5
	mg/L as K	RMAAS	KKUR	5	0.01	0.05
		WAAS	KKUR	25	0.05	0.25
Potassium-Xsc	meq/100g K	DOCATION	KKESC	0.75	0.01	0.05
Sand	% by weight	DOPARTSZ	SAND	100	1	5
Silicon	mg/L as Si	ROM	SIO3UR	10	0.05	0.25
Silt	% by weight	DOPARTSZ	SILT	100	1	5
Sodium	mg/L as Na	PRAA	NAUR	1	0.005	0.025
		PRAAS	NAUR	4	0.01	0.05
	ug/filt Na	PRLOV	NAUR	50	0.5	2.5
	mg/L as Na	RMAAS	NAUR	20	0.02	0.1
		WAAS	NAUR	100	0.2	1
Solids - Diss	mg/L	SOLIDS	RSF	3000	2	10
Solids - Ign	mg/L	SOLIDS	RSFA	3000	2	10
			RSPA	3000	0.5	2.5
			RSTA	30000	2	10
Solids - Part	mg/L	SOLIDS	RSP	3000	0.5	2.5
Solids - Tot	mg/L	SOLIDS	RST	60000	2	10
Sulphate	mg/L SO ₄	PRIC1	SSO4UR	10	0.05	0.25
	ug/filt SO ₄	PRLOV	SSO4UR	500	1	5

PARAMETER	UNITS	WORK STATION	TEST CODE	FULL SCALE	W	T
Sulphate.....	ug/filt SO ₄ ...	PRSEQ.....	SSO4FR.....	250.....	1.....	5
			SSO4NF.....	250.....	1.....	5
	mg/L as SO ₄	RMDSO4.....	SSO4UR.....	100.....	0.5.....	2.5
Sulphate - Xw.....	ug/g as SO ₄	DOANIONX.....	SSO4EW.....	100.....	0.5.....	2.5
Sulphur Dioxide.....	ug/filt SO ₂	PRSEQ.....	SSO2FR.....	350.....	1.....	5
Turbidity.....	FTU.....	RMTURB.....	TURB.....	200.....	0.05.....	0.25
		WTURB.....	TURB.....	200.....	0.05.....	0.25
Zinc - Tot.....	ug/g as Zn.....	DOHMTE.....	ZNUT.....	100.....	0.5.....	2.5
Zinc.....	ug/L as Zn.....	DOASV.....	ZNUT.....	15.....	0.5.....	2.5



(7924)

TD/380/P47/MOE

[illegible]